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Primary Care Physicians' Attitudes and Perceptions toward Antibiotic Resistance and Outpatient Antibiotic Stewardship: A Qualitative Study

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Title: Primary Care Physicians' Attitudes and Perceptions toward Antibiotic Resistance and Outpatient Antibiotic Stewardship: A Qualitative Study

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Abstract:

Objectives: At least 30% of outpatient antibiotic prescriptions are unnecessary. Outpatient antibiotic stewardship is needed to improve prescribing and address the threat of antibiotic resistance. A better understanding of primary care physicians' (PCPs) attitudes towards antibiotic prescribing and outpatient antibiotic stewardship is needed to identify barriers to stewardship implementation and help tailor stewardship strategies. The aim of this study was to assess PCPs' current attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and the feasibility of outpatient stewardship efforts.

Design: Eight focus groups were conducted with PCPs in 4 U.S. cities: Philadelphia, Birmingham, Chicago, and Los Angeles – one with family medicine/internal medicine physicians and one with pediatricians in each city. An independent moderator conducted each focus group using a moderator guide. Focus groups were audio-recorded, transcribed, and coded for major themes using deductive and inductive content analysis methods.

Results: Twenty-six family medicine/internal medicine physicians and 26 pediatricians participated. Participants acknowledged that resistance is an important public health issue, but not as important as other pressing problems (e.g., obesity, opioids). Many considered resistance to be more of a hospital issue. While participants recognized inappropriate prescribing as a problem in outpatient settings, many felt that the key drivers were non-primary care settings (e.g., urgent care clinics, retail clinics) and patient demand. Participants reacted positively to stewardship efforts aimed at educating patients and clinicians. They questioned the validity of antibiotic prescribing metrics. This skepticism was due to a number of factors, including the feasibility of capturing prescribing quality, a belief that physicians will "game the system" to improve their measures, and dissatisfaction and distrust of quality measurement in general.

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Conclusions: Stakeholders will need to consider physician attitudes and beliefs about antibiotic stewardship when implementing interventions aimed at improving prescribing.

Strengths and limitations of this study

- This study presents new data on U.S.-based primary care physicians' attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and outpatient antibiotic stewardship approaches.
- Eight focus groups with internal medicine physicians, family medicine physicians, and pediatricians were held in four geographically-dispersed U.S. cities, which allowed for a wide-range of viewpoints to be represented in the dataset.
- The focus groups did not include all types of clinicians that provide primary care in the U.S. (e.g., nurse practitioners, physician assistants).
- Although physicians from across the U.S. were included in this study, the small sample size limits the generalizability of these findings.

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Introduction

Antibiotic resistance poses a growing threat to public health and antibiotic use is a primary driver of the development of resistant bacteria. In the United States, the majority of antibiotics used in humans are prescribed in outpatient healthcare settings.(1) Considering the volume of antibiotics prescribed and data from other countries, ambulatory antibiotic prescribing probably accounts for 80-90% of all antibiotic prescribing.(2,3)

There were 270.2 million outpatient antibiotic prescriptions dispensed in 2016.(4) While this represents a 5% decrease since 2011, prescribing rates have been relatively stable from 2014-2016.(4) The largest proportion of prescriptions in 2016 (39%) were written by primary care physicians (PCPs).(5) Previous studies have found that a significant proportion of outpatient antibiotic prescriptions are inappropriate.(6-10) Many of these inappropriate prescriptions were for acute respiratory conditions that often do not require antibiotics.(6,8-9)

To address this overuse, the Centers for Disease Control and Prevention (CDC) published core elements of antibiotic stewardship in outpatient settings, highlighting steps that stakeholders can take in support of stewardship efforts.(11) However, additional work is needed to ensure outpatient stewardship efforts are expanded nationwide.

A better understanding of physicians' attitudes towards antibiotic prescribing and their perceptions on the feasibility and impact of stewardship interventions is needed to identify barriers to stewardship implementation in U.S. ambulatory settings and to allow stakeholders to better tailor

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strategies to improve prescribing. In order to assess these attitudes among outpatient physicians, we conducted a series of semi-structured focus groups among PCPs in the United States.

Methods

Study Design

We conducted eight focus groups in November and December of 2017 with PCPs in four U.S. cities – Philadelphia, PA; Birmingham, AL; Chicago, IL; and Los Angeles, CA. These cities were selected to represent each of the four U.S. Census regions in order to account for any potential differences in attitudes based on geographic region. Research has shown clear differences in overall outpatient antibiotic prescribing rates by geographic region.(4) Additionally, the majority of primary care physicians in the U.S. specialize in family medicine, internal medicine, or pediatrics. As such, two focus groups were conducted in each city – one with family medicine and internal medicine physicians and one with pediatricians.

A screening questionnaire was developed to recruit participants. Inclusion criteria included self-report of board certification in pediatrics, family medicine, or internal medicine; being a full-time physician primarily practicing in an outpatient office setting; spending ≥ 50% of medical practice time in direct patient care; and fluency in English. Participants were excluded if they reported being > 65 years-old; board-certified in a subspecialty outside of primary care; or an employee or paid consultant of any of the following organizations: a pharmaceutical, medical device, or

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biotechnology company, an advertising or healthcare marketing company, or a governmental or regulatory agency.

Study participants were recruited by M3 Global Research, a medical market research firm. Participants were initially recruited from a panel of healthcare professionals maintained by M3. For three cities – Chicago, Birmingham, and Los Angeles – additional participants were recruited from physician panels maintained by local partners to ensure adequate participation. Individuals located within a 30-mile radius of each focus group facility were contacted by telephone or online and screened for participation in this study. Any participant recruited online received a follow-up call from M3 to confirm their eligibility.

Each focus group lasted between 1.5 and 2 hours and was moderated by the same independent moderator with experience in qualitative research. Prior to each focus group, participants received an informed consent form to review and sign. Each participant received $400 to compensate for their time.

This study was reviewed and deemed exempt by the Chesapeake IRB (now known as Advarra).

Data Collection and Analysis

The study team and the external moderator developed a semi-structured moderator guide (see Supplementary Data). The guide began by asking participants to rank a number of public health issues in terms of importance in their daily practice. These issues included excess body weight and

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obesity, antibiotic resistance, misinformation about childhood vaccines (pediatricians only), opioid abuse, diabetes, patient non-compliance with drug regimens, and smoking/tobacco use.

The guide then asked questions aimed at understanding the physicians' attitudes and perceptions around antibiotic use and stewardship, including factors that influence their antibiotic prescribing decisions and if/how they communicate with patients about these decisions. They were also given handouts that defined and provided examples of the CDC's Core Elements of Outpatient Antibiotic Stewardship.(11) These handouts were used to gauge perceptions on the feasibility and impact of the core elements and associated activities.

Finally, participants were asked for feedback on activities that encourage antibiotic stewardship implementation and resource availability to do so. Respondents provided opinions on the feasibility and effectiveness of example policies and activities that could be implemented by healthcare stakeholders to encourage stewardship implementation. To assess resource availability, participants were asked to provide feedback on current access to certain tools to support antibiotic stewardship efforts, such as feedback reports on antibiotic prescribing practices or access to patient education materials and, if not, how much of a burden it would be to obtain access.

All focus groups were audio and video-recorded, transcribed, and coded for major themes in NVivo 11 (QSR International). Common themes were identified by three study authors (RZ, AS, DH), using both deductive and inductive content analysis methods.(12) An initial list of themes was identified based on current literature and the authors' familiarity with the focus group discussions. The initial themes were then modified and additional themes were added through

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further review of the transcripts. Themes were independently coded by two authors (RZ, AS) and reviewed by another author (DH), and any disagreement in coding was discussed until consensus was met.

Patient and Public Involvement

This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Results

A total of 52 PCPs – 26 family medicine and internal medicine physicians and 26 pediatricians – participated in the focus groups. A number of common themes were identified across these focus groups that illustrated attitudes around antibiotic resistance as a public health issue, drivers of antibiotic prescribing, and the acceptability of different antibiotic stewardship interventions (**Tables 1-4**).

Antibiotic Resistance as a Public Health Issue

Antibiotic resistance seen as less important than other public health issues A common theme among focus group participants was the perception of antibiotic resistance being less important in

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their daily practice when compared with other public health issues they commonly faced, such as obesity, diabetes, and opioid misuse.

Antibiotic resistance is an issue, but not for my patient population While many participants acknowledged that antibiotic resistance is a concern, many did not see it as an issue that impacted their patients or their daily practice. Instead, many considered antibiotic resistance as something affecting sicker, hospitalized patients. Some participants acknowledged that they have seen an increase in resistant infections in their patients with urinary tract infections or skin infections. However, they still classified resistance as an issue largely impacting inpatient medicine.

Drivers of Antibiotic Prescribing

Externalized responsibility for inappropriate antibiotic prescribing Another theme was the belief that inappropriate outpatient antibiotic prescribing is largely driven by clinicians other than themselves, namely those practicing in urgent care offices and retail clinics. This contributed to the feeling that resisting patient demand for antibiotics is futile, as patients can simply see another clinician and get what they want. Participants also believed patients' past experiences of receiving antibiotics from another clinician when they presented with similar symptoms reinforced patient expectations for antibiotics – making it harder for them to counteract patient demands.

Patient demand as a driving factor When discussing drivers of antibiotic prescribing habits, a common theme was the pressure participants experience from patients who the prescribers perceive to expect antibiotics even when not medically indicated. Participants believed that

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patients often feel entitled to leave a visit with a material treatment – often an antibiotic - after spending time and money at a doctor's office. Participants argued that patient pressure is compounded by the use of patient satisfaction scores when grading physician performance. They expressed concern that, if they refused to prescribe an antibiotic for a patient who expected one, that the patient might write a negative review and/or score the physician poorly.

Some participants indicated that the impact of patient expectations for antibiotics on their prescribing decisions can vary. For example, participants indicated that they may be more willing to push back against prescribing an antibiotic if they have a long-standing relationship with a patient. This was common among pediatricians as many of them indicated they have many opportunities to interact with patients and their parents during well child visits, making it easier for them to discuss why an antibiotic is or is not needed with parents.

Antibiotic Stewardship – Patient and Provider Education

Need for patient education Consistent with their concerns around perceived patient demand for antibiotics, participants emphasized that, in order for them to be able to effectively do their jobs, their patients need to be educated about when antibiotics are and are not appropriate and why judicious antibiotic use is critical to combating antibiotic resistance. Participants suggested several approaches for educating the public, including written education materials in different languages, educational videos for waiting rooms, and direct-to-consumer advertisements. Finally, many physicians emphasized the need to provide education in advance of a patient visit. By the time a patient is at a doctor's office for an illness, many felt it was too late to change patient expectations.

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Acceptability of physician education Many participants indicated that physician education would also be a welcome approach for outpatient antibiotic stewardship. Educational efforts were viewed as more helpful for physicians compared to other interventions, such as providing feedback on prescribing practices, which was viewed as more critical of physicians. For example, participants indicated that training in how to communicate antibiotic prescribing decisions to patients would be helpful. A few participants mentioned that requiring outpatient physicians to complete continuing medical education (CME) on antibiotic use – similar to requirements for CME around opioid prescribing – may be helpful. However, other participants indicated that they would prefer voluntary rather than mandatory CME.

Antibiotic Stewardship – Measuring Antibiotic Prescribing

Feasibility of measuring antibiotic prescribing Participants expressed concerns about antibiotic stewardship activities focused on measuring inappropriate antibiotic use, questioning the feasibility of assessing prescribing quality while accounting for different patient populations. Some participants indicated that developing antibiotic use reports would likely require significant financial and time investments. Many participants argued that antibiotic use measures are unlikely to capture all of the clinical elements from an office visit to provide the full context behind an antibiotic prescription, and that setting standards for the quality of antibiotic use would be difficult. Some questioned who would be qualified to set these standards and how that might impact the accuracy and fairness of antibiotic use measures.

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Belief that physicians will "game the system" Participants also argued that, if antibiotic use measures were developed and implemented, other physicians would simply "game the system" to improve their antibiotic prescribing scores. Many believed that physicians could easily identify what diagnosis codes they were being measured on and shift coding practices to more antibiotic-appropriate conditions.

Dissatisfaction with the quality measurement system Many participants also expressed dissatisfaction and general distrust of quality measurement systems and reporting processes. Participants often expressed a sense of feeling over-measured and being blamed for things beyond their control. Participants argued that quality measures assume that medicine is black and white and do not account for their need to use clinical judgment when treating patients. Some expressed concern that any new measure could eventually be turned around and used against them.

Distrust of tracking and reporting systems Finally, participants highlighted issues that they have experienced with the inaccuracy of tracking and reporting systems. For example, participants indicated that they often receive feedback reports that include patients that they have not seen in years, or feedback reports with clear coding errors. These inaccuracies lead them to generally dismiss the utility of these reports.

Discussion

We conducted focus groups with PCPs to assess their knowledge and attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and outpatient antibiotic stewardship approaches.

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While participants recognized the public health importance of antibiotic resistance and antibiotic use, they felt these issues were less important compared to other public health priorities in outpatient care. Most participants felt they were already good antibiotic stewards, but that their efforts were hindered by patient demand for antibiotics and the prescribing practices of other physicians. They also remain skeptical about the feasibility and effectiveness of different stewardship activities. While participants reacted positively to patient and physician education, many remained unconvinced about the utility of antibiotic use tracking and reporting.

Participants' negative attitudes regarding the feasibility of measuring the quality of antibiotic use in an accurate or fair manner, and their distrust of the quality measurement system in general factored into participants' perceptions on the impact of antibiotic use measurement as a stewardship strategy. Some recognized that it could have a beneficial impact on prescribing decisions – particularly if measurement activities focused on physicians who were high prescribers or if the measures were provided for self-evaluation. However, others felt that antibiotic use measures would be ineffective and ripe for micromanagement by external stakeholders, or that the results would not provide them with enough information to improve their prescribing.

Some of our findings are consistent with previous studies. Past research has consistently shown that physicians consider patient demand and prescribing of other physicians to be primary drivers of inappropriate antibiotic prescribing.(13-20) Our study highlights that these factors continue to be a concern for PCPs. Additionally, two interview-based studies of primary care clinicians in the UK and Europe showed a general recognition that antibiotic resistance is an important issue, but many were less concerned about resistance in their daily practice.(21, 22) However, one study of

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primary care clinicians in the U.S. found that their participants expressed considerable concern about availability of antibiotics in the future as resistance increases.(13) Our study adds to these findings by placing antibiotic resistance within the broader context of public health issues. Our participants consistently identified antibiotic resistance as a lower priority for their practice compared to other health concerns.

Regarding antibiotic use measurement, a previous study evaluated pediatrician perceptions of an intervention that included audit and feedback of antibiotic prescribing practices.(14) Study authors found high skepticism among their physicians about the quality and accuracy of the feedback reports, with one physician admitting to "gaming the system" by using bacterial diagnoses to avoid negative reports. Additional studies have evaluated physician perceptions of the broader quality measurement system. One study of U.S. physicians in three states found that 71% felt that pediatric quality reports were effective at improving pediatric care.(23) However, in interviews with providers in two of these states, authors found that physicians were frustrated with certain aspects of the quality reports, such as the inclusion of measures that they felt were outside of their control.(23) A 2009 survey of U.S. physicians on perceptions of Medicare's Physician Quality Reporting Initiative (PQRI) found that 50% of physicians participating in PQRI programs believed it had no impact on quality of care.(24)

Many of our findings are consistent with research on self-enhancement bias—that people take full credit for their success but are quick to dismiss failures as caused by external factors.(25,26) Self-enhancement is adaptive because it protects against being discouraged or down on one's self, preserves a person's self-image, and keeps them motivated to work and thrive in their life. This

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may explain findings from our focus groups, including: (1) the physicians' belief that patients' antibiotic knowledge deficits and other clinicians' behaviors were key drivers of overprescribing, and (2) their defensive responses when confronted with the potential for reports of their own prescribing by questioning the validity of the measurement enterprise. These perceptions present a challenge when addressing inappropriate antibiotic prescribing. Some approaches that have been successful in reducing antibiotic overprescribing invert the problem of self-enhancement by using it as a way to encourage or reward appropriate prescribing. These interventions engender reputational concerns when antibiotics are used or make explicit social comparisons of performance with others to encourage pursuit of a positive self-image (e.g., the prospect of becoming a "top performer") through lower prescribing.(27,28)

This study has limitations. Because this is a qualitative study with a small sample size, these findings cannot be generalized to the broader PCP population. Participants were drawn from physician databases maintained for research purposes. Physicians who were recruited and who participated in these focus groups may have different or stronger opinions than those who did not. Finally, this study evaluated physicians who specialized in family medicine, internal medicine, or pediatrics. We did not include other primary care clinicians, such as nurse practitioners or physician assistants. Additional research will be needed to assess whether these findings are applicable to the broader primary care clinician community.

In conclusion, the findings from these focus groups show that more work is needed to elevate the issue of antibiotic resistance and the need for improved prescribing among PCPs. Additionally, current skepticism among PCPs about the feasibility and accuracy of antibiotic use measurement

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may create concern around interventions that rely solely on tracking and reporting prescribing. It will be important to address these perceptions when designing interventions aimed at decreasing inappropriate antibiotic prescribing in outpatient settings.

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Conflict of Interest

Dr. Linder, Dr. Gerber, and Dr. Doctor all received honoraria for time dedicated to this research project. Dr. Doctor has received consultant fees from Precision Health Economics and University of Pennsylvania Health System. Dr. Linder was supported by grants from the National Institute on Aging (R21AG057400, R21AG057396, R21AG057383), National Institute on Drug Abuse (R21AG057395), Agency for Healthcare Research and Quality (R01HS024930, R01HS026506), The Peterson Center on Healthcare, and a contract from the Agency for Healthcare Research and Quality (HHSP2332015000201).

Contributors' Statement

Ms. Zetts led the development of the study concept and design, participated in the analysis and interpretation of data, and drafted the manuscript.

Ms. Stoesz participated in the analysis and interpretation of data and provided critical revision of the manuscript.

Ms. Garcia provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Doctor provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Gerber provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Linder provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Hyun provided supervision in the development of the study concept and design, participated in the analysis and interpretation of data, and provided critical revision of the manuscript.

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Table 1. Themes and quotations from primary care physicians regarding antibiotic resistance as a public health issue

Themes	Quotations
Antibiotic resistance seen as less important than other public health issues faced by primary care physicians	(1) "We are seeing some MRSA. Everybody does. It is just so low on the totem pole compared to the other things that we are seeing. – Birmingham, family medicine/internal medicine physician (2) "It's important, but in everyday practice I thought that other things were more important." – Chicago, pediatrician
Antibiotic resistance is an issue, but not for my patient population	(1) "I thought about antibiotic resistance as more of a problem, not in my practice that much, but in a hospital with a very sick person where they can't find something because somebody's resistant." – Chicago, pediatrician (2) "It's not like I'm seeing my patients having an issue on a regular basis like these other things are. There's this threat of this crazy super bug that will take over the world and kill us all, but I've never – it doesn't seem like reality. – Philadelphia, family medicine/internal medicine physician (3) "We're starting to see it in the community. I think if you had a table full of infectious disease doctors working in intensive care units, you would have different priorities. But in the outpatient, we probably see it less […] It is a matter of time before we see it more. Who knows, a year, two, three from now, these numbers might be different." – Philadelphia, family medicine/internal medicine physician

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Table 2. Themes and quotations from primary care physicians regarding drivers antibiotic prescribing

Themes	Quotations
Externalized responsibility for inappropriate antibiotic prescribing	(1) "I think those of us who have our own practice and control of things probably […] 'get it' more than the hourly non-vested person in your walk-in clinics who are just basically drawing an hourly salary and their whole interest is in just getting rid of somebody." – Birmingham, family medicine/internal medicine physician (2) "We're always practicing evidence-based medicine, so it becomes incredibly challenging. With adult medicine, they'll give out antibiotics over the phone, antibiotics without doing swabs and chest X-rays, things like that, or even seeing the patient." – Chicago, pediatrician (3) "A lot of us don't like to prescribe antibiotics, but they go to urgent cares and they go to […] one-minute clinics and they get prescribed antibiotics." – Los Angeles, family medicine/internal medicine physician
Patient demand as a driving factor	(1) "We're under pressure all day. You don't want to get written up, potentially, for being insensitive, or not taking care of them, or physician ratings." – Birmingham, pediatrician (2) "They come in and it's a boxing match. You are fighting in that corner with the misconception, preconceived notion and you're trying to tell them that 2 + 2 = 4 and they are saying, "No, it's purple". – Birmingham, family medicine/internal medicine physician (3) "Sometimes you just like, you know what, I'm beaten down; so, here's your Z-Pak. See you. Next patient. I'm not going to sit here and argue with somebody for five minutes over why they don't need it." – Philadelphia, family medicine/internal medicine physician

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Table 3. Themes and quotations from primary care physicians regarding patient and provider education as antibiotic stewardship activities

Themes	Quotations
Need for patient education	(1) "It will not work unless you educate the population. You cannot attack the doctors and curtail what they are doing until you educate patients that your doctor is doing the right thing." – Birmingham, family medicine/internal medicine physician (2) "I think it's more education. I think you could probably do more with a commercial than you can with anything else." – Chicago, pediatrician
Acceptability of physician education	(1) "Parents are going to ask. They don't know what's right or wrong. They're not medically trained. It's the physicians that need more education about not prescribing." – Chicago, pediatrician (2) "I think the best education strategy we could get and maybe there could be a study done is how, what is the best way to communicate to patients that antibiotic overprescribing and resistance is a problem and that rings true to them, that we can tell them this and they're going to understand that and accept the fact that it didn't lead to antibiotics." – Los Angeles, family medicine/internal medicine physician

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Table 4. Themes and quotations from primary care physicians regarding antibiotic use measurement as an antibiotic stewardship activity

Feasibility of measuring antibiotic prescribing	(1) "Like I said, you'll get patients who were seen within hours by 2 different people, and one gives the antibiotic and the other one doesn't. It's not necessarily that the person who doesn't give it is always right, and the other one's always wrong. It's too subjective." – Chicago, pediatrician (2) "There's more thought process into the physician having to, there's a reason basically why a physician chooses or not chooses to, the management specifically. So, until they actually come and look at our, the history, the physical, and overall clinical management, they really will not know why we prescribed the way we did it." – Los Angeles, family medicine/internal medicine physician
Belief that physicians will "game the system"	(1) "As soon as you start having measurements like that, you're going to have a lot more diagnoses of walking pneumonia or pneumonia." – Los Angeles, family medicine/internal medicine physician (2) "People don't put down accurate diagnoses, and then when you have something like this, then everyone is going to start gaming the system. 'I'm not going to put down diagnosis of bronchitis. No, I'm going to put sinusitis.' Even through it's bronchitis, I can give you the antibiotic and not get dinged for it." – Philadelphia, family medicine/internal medicine physician
Dissatisfaction with the quality measurement system	(1) "These days we're all getting measured on everything. Every time we click a button on the EMR whether it's diabetes, cholesterol, blood pressure, antibiotic prescribing, no matter what it is someone's measuring it. Someone's telling us what we should be doing. I think, I'll speak for myself; physicians are starting to get tired of being told what to do." – Philadelphia, family medicine/internal medicine physician (2) "That's going to fall into a P for P program. A payment for performance which is the insurance company's way of paying doctors less money." – Los Angeles, pediatrician (3) "We've discovered that they don't work very well, and then, almost always if there's an incentive for doing something, there's going to be a punishment for not doing it. There's never just the incentive." – Birmingham, pediatrician
Distrust of tracking and reporting systems	(1) "For example, I vaccinate every kid that comes to see me with Menactra [...] [Insurance company] recently said that I did not get 23 kids, but when I go to the state registry, every single one of those kids got their Menactra, before the age of 13. Their data collection practices are questionable and manipulable, and I don't trust it." – Birmingham, pediatrician (2) "The quality of the data seems always so poor […] I have patients that I've never seen that are on my list, I had a patient that was dead for 2 years that was on my list. So the quality of the data collection and how you're going to do that is so important." – Los Angeles, family medicine/internal medicine physician

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Supplementary Data

Antibiotic Stewardship Moderator's Guide

Modified format for manuscript submission

1. Introduction
   a. Background: mirrors, taps
   b. Introduction of moderator, participants: name, years in practice, practice size, practice ownership (physician vs. hospital-owned), personal ownership status (i.e., employee vs. full/part owner)

2. Perceived Importance of Antibiotic Resistance as a Public Health Issue
   a. As physicians, you confront a myriad of public health issues that impact you and your patient care daily. I want to discuss some of those issues, so I can understand where your areas of greatest concerns are focused.
   b. Exercise #1

Exercise #1

Moderator will hand out Sheet A with the listing the following topics:

- Overweight and obesity
- Antibiotic resistance
- Misinformation about childhood vaccines (pediatricians only)
- Opioid abuse
- Diabetes
- Patient non-compliance with drug regimens
- Smoking and tobacco use

Questions

1. On your sheet, would you please rank the public health issue from most important to least important? Put a 1 next to the most important, 2 for the next most important, etc. to the least important of these topics.
2. Moderator goes around the room to get the scores, does a quick tally, and determines where antibiotic resistance falls within the list of public health issues.
3. Overall, most of you have put antibiotic resistance as X in the list. Tell me why you believe it is important. What are your concerns about antibiotic resistance in the near term, say in the next 2-3 years? What about the next 10 years? Why isn't it higher on the list? Do you think that in 10 years it will be higher on the list?

   c. What do you hear from colleagues and fellow physicians about antibiotic use and antibiotic resistance? Is it a subject of conversation when physicians get together? How much of an issue is it for you in your practice?

3. Attitudes and Perceptions of Antibiotics

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a. When you are deciding whether or not to prescribe an antibiotic for a patient, what are some of the factors you consider? (e.g., confidence in diagnosis [viral vs. bacterial infection], side effects associated with antibiotic use, AE risks such as C. diff, public health concerns such as antibiotic resistance)
   i. When patients present with ambiguous symptoms (i.e., ones that could be associated with bacterial or viral infections), do you see prescribing antibiotics for these patients as the safer option than doing nothing?
   ii. How often do adverse events or side effects associated with antibiotic use override the benefit of prescribing the antibiotic?
   iii. When those arise, what are your options for the patient?
b. Do you talk to your patients about the potential adverse events before you decide to prescribe?
   i. Is it more often the patient, or yourself who is concerned about adverse events?
c. How often in the past two months have you spoken to patients about the appropriate use of antibiotics, efficacy, resistance?
d. Have you denied anyone antibiotics in the past two months who wanted them?
   i. Could you walk me through one of those conversations? For instance, if I am your patient, how would you talk to me about this?
   ii. What motivates this discussion?
   iii. How often does the issue of antibiotic overuse, or antibiotic resistance come up in these discussions?
   iv. How long, on average, does this type of discussion take? How much pushback do you receive from patients?

4. Antibiotic Stewardship Definition
   a. Exercise #3

Exercise #3
Please write down on your pad, what antibiotic stewardship means to you. Even if it's not a term you're familiar with, just jot down a sentence about what you believe it means. Moderator will go around the room and have each participant read aloud their definition, if they have one. Moderator will then provide the following definition (verbally and in writing): "Activities that aim to ensure that antibiotics are used only when indicated and, when needed, that the most appropriate antibiotic is prescribed at the right dose and duration of therapy." Question: Do you have any thoughts on that?

   b. Exercise #4

Exercise #4
Moderator will hand out Sheet B

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Questions:

1. Do these data match with your thoughts about antibiotic resistance?
2. What matches what you believe? What is different?
3. Do these points make sense to you as the basic tenets of antibiotic stewardship? Do you think there is anything that shouldn't be these? Anything that is missing?

5. Elements of Antibiotic Stewardship (15 minutes)

a. Exercise #5

Exercise #5

Moderator will hand out modified versions of pages 16-24 of the Centers for Disease Control and Prevention's Core Elements of Outpatient Antibiotic Stewardship (https://www.cdc.gov/antibiotic-use/community/improving-prescribing/core-elements/core-outpatient-stewardship.html).

Questions:

1. I'm going to hand out some pages from the Elements of Antibiotic Stewardship. I know this is quite a bit to go through. If you will please read through this – focus on the bolded sentence and just scan the text below it. As you are reading, circle the phrases or sentences that attract you to the activity, that increase your interest in participating. If you would also cross out any phrases or sentences that you think would present a problem for you, be obstacles or would decrease your interest in the program.
2. For each element, moderator will ask for (1) Overall reaction; (2) What areas did you like – what was circled; (3) What areas did you think were obstacles or that you disliked?

6. Current/Past Stewardship or Quality Improvement Activities (15 minutes)

a. Are you doing any kind of stewardship or quality improvement activities in your practice currently related to antibiotic prescribing or treatment, or any other disease area quality improvement activities?
    i. Describe those to me.
    ii. If no antibiotic related QA activities – probe for other areas of QA activities. In descriptions, include things like data collection, analysis, interpretation, personnel used, outside consulting used, design and implementation of activities, outcomes, cost and funding.
b. In your practice, is there dedicated or protected time to perform quality improvement activities? This is for any area, not just antibiotics.
c. Is there any dedicated expertise on staff for quality improvement activities? (probe if needed: like a data analyst)
d. Is there any dedicated funding for quality improvement activities?
e. What is your motivation for implementing quality improvement activities?

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7. Tools for Adoption of Antibiotic Stewardship (15 minutes)

   a. Exercise #6

Exercise #6
Moderator will hand out Sheet C Questions: 1. On this sheet I have listed a number of the issues we have discussed. I'd like you to think about your own practice and for each of the items, check whether you have access to each potential tool. If you do have access to a tool, please indicated whether you currently use this tool to support antibiotic stewardship activities and make a few notes as to why you do or don't. If you do not have access to a tool, please indicate the level of burden it would be to develop this tool for your practice. 2. Moderator will go around the room and determine the top two or three tools to discuss. 3. For each: What makes this tool such as big burden? What are some ideas you have that might help with this? Do you think it would be a serious impediment to implementing antibiotic stewardship?

8. Policies/Tools to Encourage the Adoption of Antibiotic Stewardship (15 minutes)

   a. Exercise #7

Exercise #7
Moderator will hand out Sheet D Questions: 1. There are a number of potential resources to support your efforts in the appropriate use of antibiotics. I'm going to hand out a list that I'd like you to read. Next to each item in the list is a rating scale of 1 to 5. Please check the box for each resource that describes how motivating each of these is for you. 1 means not at all useful. 5 means very useful. You can use any number in between. When you're done, we'll discuss it. 2. Moderator will collect the ratings and run a quick tally. Discussion will then start with the statement that is most motivating and work down from there. 3. Statement X has the greatest number of you giving it a high score. Those of you that gave it a high score, tell me what about X is the most useful. Are there any problem with it? (Moderator will then continue on for each of the 8 remaining statements.) 4. Is there anything that isn't on this list that you have seen utilized for other quality improvement programs that you think might be effective here?

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b. Realistically, without external aid/requirements, what is the likelihood of your adopting voluntary antibiotic stewardship activities? (defined as having the elements discussed previously: data tracking and reporting, development and implementation of improvement activities, education/training of providers and staff, etc.)
c. Do patient satisfaction scores influence your decision-making around prescribing antibiotics? What kind and how much of an impact do they have?
d. If you wanted to implement antibiotic stewardship activities in your practice, or just improve your antibiotic prescribing, what do you think would be helpful to you?
    i. Toolkits on how to implement antibiotic stewardship interventions?
    ii. Feedback on antibiotic prescribing patterns in your area/practice?
    iii. Incentives from payers?
    iv. Other?

9. Quality Measures for Appropriate Antibiotic Use (10 minutes)

a. Our last subject today is quality measures. How familiar would you say you are with the Healthcare Effectiveness Data and Information Set (HEDIS) published by the National Committee for Quality Assurance (NCQA).
    i. For antibiotics, other disease areas?
    ii. Do you report HEDIS measures related to antibiotic use as part of your quality reporting?
    iii. Do you believe that these measures appropriately capture your antibiotic prescribing practices? Is the HEDIS measure accurate for your practice? (e.g., Bronchitis (adults) and upper respiratory infections (children)) If the participants indicate they do not think these measures accurately capture their prescribing, ask what would be needed for them to trust these data?
b. At your practice, are there direct/individual financial incentives for you – i.e., bonuses – tied to your performance on quality measures (antibiotics or otherwise)? In your opinion, do they work?
c. If antibiotic use quality measures were among the measures you can choose from to report to public (CMS) or private health plans as part of quality reporting requirements, how likely is it that you will select antibiotic quality measures vs. other quality measures?

10. Thank and end group

Sheet A

	Ranking 1-6 1 = most important 6 = least important
A. Overweight and Obesity	
B. Opioid Abuse	
C. Antibiotic Resistance	
D. Misinformation About Childhood Vaccines (pediatricians only)	
E. Diabetes	

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F. Patient Non-Compliance with Drug Regimens	
G. Smoking and Tobacco Use	

Sheet B

According to the CDC, antibiotic resistance is among the greatest public health threats today.

- Leading to an estimated 12 million infections and 23,000 deaths per year in the US.

The most important modifiable risk factor for antibiotic resistance is inappropriate prescribing of antibiotics.

- Approximately half of outpatient prescribing in humans might be inappropriate including:
  - Antibiotic selection
  - Dosing or duration
  - Unnecessary antibiotic prescribing
- Estimates are that at least 30% of outpatient antibiotic prescriptions in the US are unnecessary.

Antibiotic stewardship is the effort

- To measure antibiotic prescribing
- To improve antibiotic prescribing by clinicians and use by patients so that antibiotics are only prescribed and used when needed
- To minimize misdiagnoses or delayed diagnoses leading to underuse of antibiotics
- To ensure that the right drug, dose, and duration are selected when an antibiotic is needed

Sheet C

Potential tools available to use antibiotics more effectively	Currently have access to this	If you have access, are you currently using this tool to support antibiotic stewardship efforts? Why/why not?	If you do not have access, how much of a burden would it be to develop this type of tool for your practice?
1. Timely, Accurate Feedback Reports on Antibiotic Prescribing			☐ Not a burden ☐ Some burden ☐ Large burden

2. Information on antibiotic adverse effects seen in your patients			☐ Not a burden ☐ Some burden ☐ Large burden
3. Reports from electronic health records on antibiotic prescribing practices.			☐ Not a burden ☐ Some burden ☐ Large burden
4. Clinical decision support tools for antibiotic prescribing/ diagnosis aids that leads to antibiotic prescribing			☐ Not a burden ☐ Some burden ☐ Large burden
5. Patient triage system			☐ Not a burden ☐ Some burden ☐ Large burden
6. Access to experts in infectious diseases, pharmacy, quality improvement practices			☐ Not a burden ☐ Some burden ☐ Large burden
7. Access to physician education/ training materials on antibiotic prescribing			☐ Not a burden ☐ Some burden ☐ Large burden
8. Access to materials for patient education on appropriate use of antibiotics			☐ Not a burden ☐ Some burden ☐ Large burden

Sheet D

Potential feedback loops on antibiotic use	1 Not at all useful	2	3	4	5 Very useful
1. If you received a letter from state department of health or health plan notifying your that you or your practice is a “high prescriber” of antibiotics when compared to other providers in your state/region					
2. If private health plans create a stand-alone quality incentive program for antibiotic stewardship					

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3. If private health plans include antibiotic stewardship as a “menu item” for a quality incentive program					
4. If your state publicly recognizes practices/individuals that have demonstrated most appropriate antibiotic prescribing					
5. If your state publicly publishes results of quality measures for appropriate antibiotic use for all practice locations					
6. If your state department of health publishes aggregate data on the volume of outpatient antibiotic prescribing in your state					
7. If your state publicly reports “high prescribing” practices					
8. If you received a report card from state department of health or health plans that measure the rates of antibiotic adverse events for your patients compared to other providers in your state/region					
9. If you received a report card from state department of health or health plans on quality measures for antibiotics when compared to other providers in your state/region					

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Primary Care Physicians' Attitudes and Perceptions toward Antibiotic Resistance and Outpatient Antibiotic Stewardship: A Qualitative Study

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Title: Primary Care Physicians' Attitudes and Perceptions toward Antibiotic Resistance and Outpatient Antibiotic Stewardship: A Qualitative Study

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Abstract:

Objectives: At least 30% of outpatient antibiotic prescriptions are unnecessary. Outpatient antibiotic stewardship is needed to improve prescribing and address the threat of antibiotic resistance. A better understanding of primary care physicians' (PCPs) attitudes towards antibiotic prescribing and outpatient antibiotic stewardship is needed to identify barriers to stewardship implementation and help tailor stewardship strategies. The aim of this study was to assess PCPs' current attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and the feasibility of outpatient stewardship efforts.

Design: Eight focus groups were conducted with PCPs in 4 U.S. cities: Philadelphia, Birmingham, Chicago, and Los Angeles – one with family medicine/internal medicine physicians and one with pediatricians in each city. An independent moderator conducted each focus group using a moderator guide. Focus groups were audio-recorded, transcribed, and coded for major themes using deductive and inductive content analysis methods.

Results: Twenty-six family medicine/internal medicine physicians and 26 pediatricians participated. Participants acknowledged that resistance is an important public health issue, but not as important as other pressing problems (e.g., obesity, opioids). Many considered resistance to be more of a hospital issue. While participants recognized inappropriate prescribing as a problem in outpatient settings, many felt that the key drivers were non-primary care settings (e.g., urgent care clinics, retail clinics) and patient demand. Participants reacted positively to stewardship efforts aimed at educating patients and clinicians. They questioned the validity of antibiotic prescribing metrics. This skepticism was due to a number of factors, including the feasibility of capturing prescribing quality, a belief that physicians will "game the system" to improve their measures, and dissatisfaction and distrust of quality measurement in general.

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Conclusions: Stakeholders will need to consider physician attitudes and beliefs about antibiotic stewardship when implementing interventions aimed at improving prescribing.

Strengths and limitations of this study

- This study presents new data on U.S.-based primary care physicians' attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and outpatient antibiotic stewardship approaches.
- Eight focus groups with internal medicine physicians, family medicine physicians, and pediatricians were held in four geographically-dispersed U.S. cities, which allowed for a wide-range of viewpoints to be represented in the dataset.
- The focus groups did not include some types of clinicians that provide primary care in the U.S. (e.g., nurse practitioners, physician assistants).
- Although physicians from across the U.S. were included in this study, the small sample size limits the generalizability of these findings.

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Introduction

Antibiotic resistance poses a growing threat to public health and antibiotic use is a primary driver of the development of resistant bacteria. In the United States, the majority of antibiotics used in humans are prescribed in outpatient healthcare settings.[1] Considering the volume of antibiotics prescribed and data from other countries, ambulatory antibiotic prescribing likely accounts for 80-90% of all antibiotic prescribing.[2,3]

There were 270.2 million outpatient antibiotic prescriptions dispensed in 2016.[4] While this represents a 5% decrease since 2011, prescribing rates have been relatively stable from 2014-2016.[4] Previous studies have found that a significant proportion of outpatient antibiotic prescriptions are inappropriate.[5-9] Many of these inappropriate prescriptions were for acute respiratory conditions that often do not require antibiotics.[5,7,8]

In order to improve antibiotic prescribing in primary care offices and other outpatient healthcare settings, the Centers for Disease Control and Prevention (CDC) published core elements of outpatient antibiotic stewardship, highlighting steps that stakeholders can take in support of stewardship efforts.[10] However, additional work is needed to ensure outpatient stewardship efforts are expanded nationwide. A better understanding of physicians' attitudes towards antibiotic prescribing and their perceptions on the feasibility and impact of stewardship interventions would identify barriers to stewardship implementation in U.S. ambulatory settings and would allow stakeholders to better tailor strategies to improve prescribing.

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Previous studies have shown that physicians consider patient demand and prescribing of other physicians to be primary drivers of inappropriate antibiotic prescribing.[11-24] In order to counteract these drivers of inappropriate prescribing, physicians have highlighted a need for improved public education around antibiotic resistance and the need for appropriate prescribing.[20-23,25] Additionally, two interview-based studies of primary care clinicians in the UK and Europe showed a general recognition that antibiotic resistance is an important issue, but many were less concerned about resistance in their daily practice.[26,27] A systematic review of studies from different countries found a similar dynamic.[25]

Expanding upon this research to gain a better understanding of current attitudes about antibiotic prescribing and the perceived impact of different antibiotic stewardship approaches among U.S. outpatient physicians is needed. This is especially true for primary care physicians (PCPs) given that they account for the largest proportion of outpatient antibiotic prescriptions (38%) in the United States.[28]

In the United States, primary care services are often provided by family medicine physicians, internists, and pediatricians.[29] The provision of these services can be fragmented. Many patients do not receive extended primary care services and after-hours care from their usual primary care offices.[30] Additionally, PCPs in the U.S. receive payment for their services from a range of commercial and public payers,[29] all of which frequently measure the quality of care to determine reimbursement levels. All of these factors have the potential to influence PCPs' views on antibiotic prescribing and approaches to improving antibiotic use in outpatient setting.

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In order to assess these attitudes and perceptions and inform strategies for antibiotic stewardship tailored to U.S. outpatient settings, we conducted a series of semi-structured focus groups among PCPs in the United States.

Methods

Study Design

We conducted eight focus groups in November and December of 2017 with PCPs in four U.S. cities – Philadelphia, PA; Birmingham, AL; Chicago, IL; and Los Angeles, CA. Focus groups were chosen for this study to allow for open discussion amongst participants and to allow for different opinions and debate. This allows both for the identification of areas where there is dissension and broad consensus during the analysis process, and adds further complexity to the themes.

The four cities were selected to represent each of the four U.S. Census regions in order to account for any potential differences in attitudes based on geographic region. Research has shown a clear difference in overall outpatient antibiotic prescribing rates by geographic region in the U.S., with individuals in Southern states prescribed antibiotics at higher rates than those in any other part of the country.[4,28] For example, in 2017 the antibiotic prescribing rate in West Virginia (the state with the highest rate) was more than double that of Alaska (the state with the lowest rate).[28] Additionally, many primary care physicians in the U.S. specialize in family medicine, internal

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medicine, or pediatrics.(29) As such, two focus groups were conducted in each city – one with family medicine and internal medicine physicians and one with pediatricians.

A screening questionnaire was developed to recruit participants. Inclusion criteria included self-report of board certification in pediatrics, family medicine, or internal medicine; being a full-time physician primarily practicing in an outpatient office setting; spending ≥ 50% of medical practice time in direct patient care; and fluency in English. Participants were excluded if they reported being > 65 years-old; board-certified in a subspecialty outside of primary care; or an employee or paid consultant of any of the following organizations: a pharmaceutical, medical device, or biotechnology company, an advertising or healthcare marketing company, or a governmental or regulatory agency.

Study participants were recruited by M3 Global Research, a medical market research firm. Participants were initially recruited from a panel of healthcare professionals maintained by M3. For three cities – Chicago, Birmingham, and Los Angeles – additional participants were recruited from physician panels maintained by local partners to ensure adequate participation. Individuals located within a 30-mile radius of each focus group facility were contacted by telephone or online and screened for participation in this study. Any participant recruited online received a follow-up call from M3 to confirm their eligibility.

Each focus group lasted between 1.5 and 2 hours and was moderated by the same independent moderator with experience in qualitative research. Prior to each focus group, participants received

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an informed consent form to review and sign. All participants signed the informed consent form. Each participant received $400 to compensate for their time.

The study protocol was reviewed for ethical considerations and deemed exempt by the Chesapeake IRB (now known as Advarra). The Standards for Reporting Qualitative Research reporting guidelines were used in the reporting of study findings (see supplementary file #1).[31]

Data Collection and Analysis

The study team and the external moderator developed a semi-structured moderator guide (see supplementary file #2). This guide aimed to draw out issues identified based on previous research – such as perceptions of antibiotic resistance and drivers of inappropriate prescribing, including patient demand – as well as explore new areas, such as the perceived impact of different stewardship strategies. The guide began by asking participants to rank a number of public health issues in terms of importance in their daily practice. These issues included excess body weight and obesity, antibiotic resistance, misinformation about childhood vaccines (pediatricians only), opioid abuse, diabetes, patient non-compliance with drug regimens, and smoking/tobacco use.

The guide then asked questions aimed at understanding the physicians' attitudes and perceptions around antibiotic use and stewardship, including factors that influence their antibiotic prescribing decisions and if/how they communicate with patients about these decisions. They were also given handouts that defined and provided examples of the CDC's Core Elements of Outpatient Antibiotic

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Stewardship.[10] These handouts were used to gauge perceptions on the feasibility and impact of the core elements and associated activities.

Finally, participants were asked for feedback on activities that encourage antibiotic stewardship implementation and resource availability to do so. Respondents provided opinions on the feasibility and effectiveness of example policies and activities that could be implemented by healthcare stakeholders to encourage stewardship implementation. To assess resource availability, participants were asked to provide feedback on current access to certain tools to support antibiotic stewardship efforts, such as feedback reports on antibiotic prescribing practices or access to patient education materials and, if not, how much of a burden it would be to obtain access.

All focus groups were audio and video-recorded, transcribed (using the audio recording), and the transcripts were coded for major themes in NVivo 11 (QSR International). Common themes were identified by three study authors (RZ, AS, DH), using both deductive and inductive content analysis methods.[32,33] We applied the following steps for analyzing the transcripts. First, reesarchers (RZ, DH) familiarized themselves with the data by observing all eight focus groups. Next, an initial list of themes was developed based on (1) a review of past studies on the topic of antibiotic resistance and stewardship in outpatient settings [11-18,34,35] and (2) the data familiarization process. These themes were independently applied to the transcripts and coded by two authors (RZ, AS) and reviewed by another author (DH). During this process, new themes were identified through further review of the transcripts and some of the initial themes were modified. Any disagreement in coding was discussed until consensus was met. Coding was considered complete once theoretical saturation was reached and no additional themes could be identified.[33]

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Patient and Public Involvement

This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Results

A total of 52 PCPs – 26 family medicine and internal medicine physicians and 26 pediatricians – accepted the invitation and participated in the focus groups. No demographic information was collected for these particpiants.

A number of common themes were identified across these focus groups that illustrated attitudes on the following topics: (1) antibiotic resistance as a public health issue, (2) drivers of antibiotic prescribing, (3) the acceptability of antibiotic stewardship interventions – patient and physician education, and (4) acceptability of performance reporting. Themes within each of these areas are highlighted below, along with areas of disagreement among participants where appropriate.

Antibiotic Resistance as a Public Health Issue

The initial discussions within each focus group centered on what participants thought about antibiotic resistance as a public health issue. Two themes were seen across focus groups –

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antibiotic resistance was seen as less of a priority than other public health issues faced by participants and antibiotic resistance was considered an issue for their patient population (Table 1).

Antibiotic resistance seen as less important than other public health issues

A common theme among focus group participants was the perception of antibiotic resistance being less important in their daily practice when compared with other public health issues they commonly faced, such as obesity, diabetes, and opioid misuse.

Antibiotic resistance is an issue, but not for my patient population

While many participants acknowledged that antibiotic resistance is a concern, many did not see it as an issue that impacted their patients or their daily practice. Instead, most participants considered antibiotic resistance as something affecting sicker, hospitalized patients. In contrast, some participants acknowledged that they have seen an increase in resistant infections in their patients with urinary tract infections or skin infections. However, these particpants still classified resistance as an issue largely impacting inpatient medicine.

Drivers of Antibiotic Prescribing

Particpiants in all focus groups also discussed what they thought was driving outpatient antibiotic prescribing. Two themes emerged: (1) participants argued that other physicians were the ones driving inappropriate prescribing, and, (2) patient demand for antibiotics continues to be an issue in primary care (Table 2).

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Attribution of inappropriate antibiotic prescribing to others

Participants indicated that they believed inappropriate outpatient antibiotic prescribing is largely driven by clinicians other than themselves, namely those practicing in urgent care offices and retail clinics. This contributed to the feeling that resisting patient demand for antibiotics is futile, as patients can simply see another clinician and get what they want. Participants also said that patients' past experiences of receiving antibiotics from another clinician reinforced patient expectations for antibiotics for the same complaint. This, in their mind, strengthens patient resolve to demand antibiotics.

Patient demand as a driving factor

When discussing drivers of antibiotic prescribing habits, a common theme was the pressure participants said they experience from patients who the prescribers perceive to expect antibiotics even when not medically indicated. Participants often returned to this theme throughout the focus group discussions. Participants contended that patients often feel entitled to leave a visit with a material treatment – often an antibiotic - after spending time and money at a doctor's office. Participants argued that patient pressure is compounded by the use of patient satisfaction scores when grading physician performance. They expressed concern that, if they refused to prescribe an antibiotic for a patient who expected one, that the patient might write a negative review and/or score the physician poorly.

However, it is important to note that some participants indicated that the impact of patient expectations for antibiotics on their prescribing decisions can vary. For example, some participants

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indicated that they may be more willing to push back against prescribing an antibiotic if they have a long-standing relationship with a patient. This was more common among pediatricians as many of them indicated they have many opportunities to interact with patients and their parents during well child visits, making it easier for them to discuss why an antibiotic is or is not needed with parents.

Acceptability of Antibiotic Stewardship Interventions – Patient and Physician Education

On the topic of antibiotic stewardship efforts focused on patient and physician education, participants primarily indicated support for these activities (Table 3).

Need for patient education

Consistent with the perception of patient demand for antibiotics generating concern, participants emphasized that, in order for them to be able to effectively do their jobs, their patients need to be educated about when antibiotics are and are not appropriate and why judicious antibiotic use is critical to combating antibiotic resistance. Participants suggested several approaches for educating the public, including written education materials in different languages, educational videos for waiting rooms, and direct-to-consumer advertisements. Finally, many physicians emphasized the need to provide education in advance of a patient visit. By the time a patient is at a doctor's office for an illness, many felt it was too late to change patient expectations.

Acceptability of physician education

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Many participants indicated that physician education would also be a welcome approach for outpatient antibiotic stewardship. Participants described educational efforts as more helpful for physicians compared to other interventions, such as providing feedback on prescribing practices, which was viewed as more critical of physicians. For example, participants indicated that training in how to communicate antibiotic prescribing decisions to patients would be helpful. One area of disagreement emerged around whether this education should be mandatory or voluntary. A few participants mentioned that requiring outpatient physicians to complete continuing medical education (CME) on antibiotic use – similar to requirements for CME around opioid prescribing – may be helpful. However, other participants indicated that they would prefer voluntary rather than mandatory CME.

Acceptability of Performance Reporting

When presented with examples of stewardship efforts aimed at measuring and providing feedback on antibiotic prescribing practices, physicians were less supportive compared to educational efforts. A number of themes emerged in this area – both themes specific to antibiotic prescribing measurement, as well as themes regarding quality measurement efforts more broadly (Table 4).

Feasibility of measuring antibiotic prescribing

Participants expressed concerns about antibiotic stewardship activities focused on measuring inappropriate antibiotic use, questioning the feasibility of assessing prescribing quality while accounting for different patient populations. Some participants indicated that developing antibiotic use reports would likely require significant financial and time investments. Many participants

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argued that antibiotic use measures are unlikely to capture all of the clinical elements from an office visit to provide the full context behind an antibiotic prescription, and that setting standards for the quality of antibiotic use would be difficult. Some questioned who would be qualified to set these standards and how that might impact the accuracy and fairness of antibiotic use measures.

Belief that physicians will "game the system"

Participants also argued that, if antibiotic use measures were developed and implemented, other physicians would simply use the rules put in place to manipulate the desired outcome (i.e., "game the system") to improve their antibiotic prescribing scores. Some participants indicated that physicians could easily identify what diagnosis codes they were being measured on and shift coding practices to more antibiotic-appropriate conditions.

Dissatisfaction with the quality measurement system

Many participants also expressed dissatisfaction and general distrust of quality measurement systems and reporting processes. Participants expressed a sense of feeling over-measured and being blamed for things beyond their control. Participants argued that quality measures assume that medicine is black and white and do not account for their need to use clinical judgment when treating patients. Some expressed concern that any new measure could eventually be turned around and used against them. Examples mentioned in different focus groups included using quality measures as a way to reimburse physicians at a lower level or a reason to fire a physician.

Distrust of tracking and reporting systems

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Finally, participants described issues that they have experienced with the inaccuracy of tracking and reporting systems. For example, participants indicated that they often receive feedback reports that include patients that they have not seen in years, or feedback reports with clear coding errors. These inaccuracies lead them to generally dismiss the utility of these reports.

Discussion

We conducted focus groups with PCPs to assess their knowledge and attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and outpatient antibiotic stewardship approaches. While participants recognized the public health importance of antibiotic resistance and antibiotic use, they felt these issues were less important compared to other public health priorities in outpatient care. This finding echoes past research,[25-27] and adds further insight by placing antibiotic resistance within the broader context of public health issues encountered in primary care. Our participants consistently identified antibiotic resistance as a lower priority for their practice compared to other health concerns. This is consistent with what has been shown in hospital-based studies, with one study identifying a lack of recognition of antibiotic resistance as an imminent threat as a barrier to stewardship.[36]

Additionally, most study participants felt they were already good antibiotic stewards, but that their efforts were hindered by patient demand for antibiotics and the prescribing practices of other physicians. These findings are consistent with previous research on perceptions of drivers of outpatient antibiotic prescribing.[11-24] In particular, the perception of patient demand as a driving force behind inappropriate prescribing practices continues to be a consistent finding across

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studies both in the U.S. and other countries. Similar perceptions have also been documented among inpatient physicians who believe that prescibers outside of hospitals are primarily responsible for antibiotic overuse and antibiotic resistance, underscoring the value for individual feedback on prescribing patterns to help these physicians recognize the need for antibiotic stewardship in their practice.[37] This indicates a continued need for stewardship efforts to address these concerns moving forward.

Along those lines, participants in our study reacted positively to education-focused stewardship activities – particularly those activities aimed at educating the general public. Participants were also supportive of education targeting physicians, such as trainings on how to best communicate antibiotic prescribing decisions with patients. Additionally findings from inpatient studies also suggest treatment guidelines can be an impacful educational tool for changing prescribing behaviors.[38,39]

In contrast to educational efforts, our study participants remained unconvinced about the utility of antibiotic use tracking and reporting as a stewardship strategy. Participants' negative attitudes regarding the feasibility of measuring the quality of antibiotic use in an accurate or fair manner, and their distrust of the quality measurement system in the U.S. in general factored into participants' perceptions on the impact of antibiotic use measurement. A previous study evaluating pediatrician perceptions of an intervention that included audit and feedback of antibiotic prescribing practices found high skepticism among physicians about the quality and accuracy of the feedback reports.[12] Additional studies have evaluated physician perceptions of the broader quality measurement system. One study of U.S. physicians in three states found that 71% felt that

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pediatric quality reports were effective at improving pediatric care.[40] However, in interviews with providers in two of these states, authors found that physicians were frustrated with certain aspects of the quality reports, such as the inclusion of measures that they felt were outside of their control.[40] A 2009 survey of U.S. physicians on perceptions of Medicare's Physician Quality Reporting Initiative (PQRI) found that 50% of physicians participating in PQRI programs believed it had no impact on quality of care.[41]

Many of our findings are consistent with research on self-enhancement bias—that people take full credit for their success but are quick to dismiss failures as caused by external factors.[42,43] Self-enhancement is adaptive because it protects against being discouraged or down on one's self, preserves a person's self-image, and keeps them motivated to work and thrive in their life. This may explain findings from our focus groups, including: (1) the physicians' belief that patients' antibiotic knowledge deficits and other clinicians' behaviors were key drivers of overprescribing, and (2) their defensive responses when confronted with the potential for reports of their own prescribing by questioning the validity of the measurement enterprise. These perceptions present a challenge when addressing inappropriate antibiotic prescribing. Some approaches that have been successful in reducing antibiotic overprescribing invert the problem of self-enhancement by using it as a way to encourage or reward appropriate prescribing. These interventions engender reputational concerns when antibiotics are used or make explicit social comparisons of performance with others to encourage pursuit of a positive self-image (e.g., the prospect of becoming a "top performer") through lower prescribing.[44,45]

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This study provides important insight into current attitudes of primary care physicians in the United States on issues related to antibiotic resistance, inappropriate antibiotic prescribing, and antibiotic stewardship implementation. Enhanced understanding of perceptions amongst these providers is critical as healthcare stakeholders work to expand stewardship activities into primary care settings. Two of the four core elements for outpatient antibiotic stewardship are tracking and reporting antibiotic prescribing practices, and the provision of education and access to expertise on antibiotic prescribing.[10] While our study shows support from PCPs for educational initiatives, more work will be needed to address PCP concerns related to tracking and reporting antibiotic use. Healthcare stakeholders will need to work to build trust among the PCP community around antibiotic prescribing feedback, and will need to identify ways to make the feedback provided to physicians actionable to help ensure impact.

Another important barrier to expanded stewardship implementation identified by this study is a continued lack of prioritization of this issue amongst PCPs. Healthcare stakeholders – including public health authorities, health plans, and health systems – will need to identify ways to incentivize stewardship uptake in primary care practices in the U.S.

By conducting focus groups in cities across the U.S. and with internists, family medicine physicians, and pediatricians, we were able to gather data from a wide-range of perspectives. The consistent themes identified throughout the focus groups suggest that barriers to stewardship implementation may be similar across the United States.

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This study also has limitations. Because this is a qualitative study with a small sample size, these findings cannot be generalized to the broader PCP population. Participants were drawn from physician databases maintained for research purposes. Physicians who were recruited and who participated in these focus groups may have different or stronger opinions than those who did not. Finally, this study evaluated physicians who specialized in family medicine, internal medicine, or pediatrics. We did not include other primary care clinicians, such as nurse practitioners or physician assistants. Additional research will be needed to assess whether these findings are applicable to the broader primary care clinician community.

In conclusion, the findings from these focus groups show that more work is needed to elevate the issue of antibiotic resistance and the need for improved prescribing among PCPs. Additionally, current skepticism among PCPs about the feasibility and accuracy of antibiotic use measurement may create concern around interventions that rely solely on tracking and reporting prescribing. It will be important to address these perceptions when designing interventions aimed at decreasing inappropriate antibiotic prescribing in outpatient settings.

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Conflict of Interest

Dr. Linder, Dr. Gerber, and Dr. Doctor all received honoraria for time dedicated to this research project. Dr. Doctor has received consultant fees from Precision Health Economics and University of Pennsylvania Health System. Dr. Doctor was supported by grants from the National Institutes of on Aging (R21AG057395, R21AG057400, R21AG057396, R21AG057383, P30AG024968, R33AG057395), the National Institute on Drug Abuse (R01 DA046226), the National Institute of Arthirist and Musculoskeletal Conditions (R01 AR073486), the Agency for Healthcare Research and Quality (R01 HS026506) and the Patient-Centered Outcome Research Institute (CDRN-1306-04864). Dr. Linder was supported by grants from the National Institute on Aging (R21AG057400, R21AG057396, R21AG057383, R21AG057395), Agency for Healthcare

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Contributors' Statement

Ms. Zetts led the development of the study concept and design, participated in the analysis and interpretation of data, and drafted the manuscript.

Ms. Stoesz participated in the analysis and interpretation of data and provided critical revision of the manuscript.

Ms. Garcia provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Doctor provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Gerber provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Linder provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Hyun provided supervision in the development of the study concept and design, participated in the analysis and interpretation of data, and provided critical revision of the manuscript.

Data sharing statement: No additional data beyond what is presented in the manuscript is available.

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Table 1. Themes and quotations from primary care physicians regarding antibiotic resistance as a public health issue

Themes	Quotations
Antibiotic resistance seen as less important than other public health issues faced by primary care physicians	(1) "We are seeing some MRSA. Everybody does. It is just so low on the totem pole compared to the other things that we are seeing. – Birmingham, family medicine/internal medicine physician (2) "It's important, but in everyday practice I thought that other things were more important." – Chicago, pediatrician
Antibiotic resistance is an issue, but not for my patient population	(1) "I thought about antibiotic resistance as more of a problem, not in my practice that much, but in a hospital with a very sick person where they can't find something because somebody's resistant." – Chicago, pediatrician (2) "It's not like I'm seeing my patients having an issue on a regular basis like these other things are. There's this threat of this crazy super bug that will take over the world and kill us all, but I've never – it doesn't seem like reality. – Philadelphia, family medicine/internal medicine physician (3) "We're starting to see it in the community. I think if you had a table full of infectious disease doctors working in intensive care units, you would have different priorities. But in the outpatient, we probably see it less […] It is a matter of time before we see it more. Who knows, a year, two, three from now, these numbers might be different." – Philadelphia, family medicine/internal medicine physician

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Table 2. Themes and quotations from primary care physicians regarding drivers antibiotic prescribing

Themes	Quotations
Attribution of inappropriate antibiotic prescribing to others	(1) "I think those of us who have our own practice and control of things probably […] 'get it' more than the hourly non-vested person in your walk-in clinics who are just basically drawing an hourly salary and their whole interest is in just getting rid of somebody." – Birmingham, family medicine/internal medicine physician (2) "We're always practicing evidence-based medicine, so it becomes incredibly challenging. With adult medicine, they'll give out antibiotics over the phone, antibiotics without doing swabs and chest X-rays, things like that, or even seeing the patient." – Chicago, pediatrician (3) "A lot of us don't like to prescribe antibiotics, but they go to urgent cares and they go to […] one-minute clinics and they get prescribed antibiotics." – Los Angeles, family medicine/internal medicine physician
Patient demand as a driving factor	(1) "We're under pressure all day. You don't want to get written up, potentially, for being insensitive, or not taking care of them, or physician ratings." – Birmingham, pediatrician (2) "They come in and it's a boxing match. You are fighting in that corner with the misconception, preconceived notion and you're trying to tell them that 2 + 2 = 4 and they are saying, "No, it's purple". – Birmingham, family medicine/internal medicine physician (3) "Sometimes you just like, you know what, I'm beaten down; so, here's your Z-Pak. See you. Next patient. I'm not going to sit here and argue with somebody for five minutes over why they don't need it." – Philadelphia, family medicine/internal medicine physician

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Table 3. Themes and quotations from primary care physicians regarding patient and physician education as antibiotic stewardship activities

Themes	Quotations
Need for patient education	(1) "It will not work unless you educate the population. You cannot attack the doctors and curtail what they are doing until you educate patients that your doctor is doing the right thing." – Birmingham, family medicine/internal medicine physician (2) "I think it's more education. I think you could probably do more with a commercial than you can with anything else." – Chicago, pediatrician
Acceptability of physician education	(1) "Parents are going to ask. They don't know what's right or wrong. They're not medically trained. It's the physicians that need more education about not prescribing." – Chicago, pediatrician (2) "I think the best education strategy we could get and maybe there could be a study done is how, what is the best way to communicate to patients that antibiotic overprescribing and resistance is a problem and that rings true to them, that we can tell them this and they're going to understand that and accept the fact that it didn't lead to antibiotics." – Los Angeles, family medicine/internal medicine physician

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Table 4. Themes and quotations from primary care physicians regarding the acceptability of performance reporting

Feasibility of measuring antibiotic prescribing	(1) "Like I said, you'll get patients who were seen within hours by 2 different people, and one gives the antibiotic and the other one doesn't. It's not necessarily that the person who doesn't give it is always right, and the other one's always wrong. It's too subjective." – Chicago, pediatrician (2) "There's more thought process into the physician having to, there's a reason basically why a physician chooses or not chooses to, the management specifically. So, until they actually come and look at our, the history, the physical, and overall clinical management, they really will not know why we prescribed the way we did it." – Los Angeles, family medicine/internal medicine physician
Belief that physicians will "game the system"	(1) "As soon as you start having measurements like that, you're going to have a lot more diagnoses of walking pneumonia or pneumonia." – Los Angeles, family medicine/internal medicine physician (2) "People don't put down accurate diagnoses, and then when you have something like this, then everyone is going to start gaming the system. 'I'm not going to put down diagnosis of bronchitis. No, I'm going to put sinusitis.' Even through it's bronchitis, I can give you the antibiotic and not get dinged for it." – Philadelphia, family medicine/internal medicine physician
Dissatisfaction with the quality measurement system	(1) "These days we're all getting measured on everything. Every time we click a button on the EMR whether it's diabetes, cholesterol, blood pressure, antibiotic prescribing, no matter what it is someone's measuring it. Someone's telling us what we should be doing. I think, I'll speak for myself; physicians are starting to get tired of being told what to do." – Philadelphia, family medicine/internal medicine physician (2) "That's going to fall into a P for P program. A payment for performance which is the insurance company's way of paying doctors less money." – Los Angeles, pediatrician (3) "We've discovered that they don't work very well, and then, almost always if there's an incentive for doing something, there's going to be a punishment for not doing it. There's never just the incentive." – Birmingham, pediatrician
Distrust of tracking and reporting systems	(1) "For example, I vaccinate every kid that comes to see me with Menactra [...] [Insurance company] recently said that I did not get 23 kids, but when I go to the state registry, every single one of those kids got their Menactra, before the age of 13. Their data collection practices are questionable and manipulable, and I don't trust it." – Birmingham, pediatrician

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	(2) “The quality of the data seems always so poor […] I have patients that I’ve never seen that are on my list, I had a patient that was dead for 2 years that was on my list. So the quality of the data collection and how you’re going to do that is so important.” – Los Angeles, family medicine/internal medicine physician

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Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the SRQRreporting guidelines, and cite them as:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-1251.

		Reporting Item	Page Number
Title			
	#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1
Abstract			
	#2	Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions	2-3
Introduction			
Problem formulation	#3	Description and signifcance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	4-6

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Purpose or research question	#4	Purpose of the study and specific objectives or questions	6
Methods			
Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenolgy, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	6-7, 20
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	7
Context	#7	Setting / site and salient contextual factors; rationale	6-7
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	6-7
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	8
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative	8-9

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		process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	8-9
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	7, 10
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	9
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	9
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	9
Results/findings			
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	10-16
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	26-30
Discussion			
Intergration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application /	16-18

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		generalizability; identification of unique contributions(s) to scholarship in a discipline or field	
Limitations	#19	Trustworthiness and limitations of findings	19-20
Other			
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were managed	20-21
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	20

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Supplementary File #2

Antibiotic Stewardship Moderator's Guide

Modified format for manuscript submission

1. Introduction
   a. Background: mirrors, taps
   b. Introduction of moderator, participants: name, years in practice, practice size, practice ownership (physician vs. hospital-owned), personal ownership status (i.e., employee vs. full/part owner)

2. Perceived Importance of Antibiotic Resistance as a Public Health Issue
   a. As physicians, you confront a myriad of public health issues that impact you and your patient care daily. I want to discuss some of those issues, so I can understand where your areas of greatest concerns are focused.
   b. Exercise #1

Exercise #1

Moderator will hand out Sheet A with the listing the following topics:

- Overweight and obesity
- Antibiotic resistance
- Misinformation about childhood vaccines (pediatricians only)
- Opioid abuse
- Diabetes
- Patient non-compliance with drug regimens
- Smoking and tobacco use

Questions

1. On your sheet, would you please rank the public health issue from most important to least important? Put a 1 next to the most important, 2 for the next most important, etc. to the least important of these topics.
2. Moderator goes around the room to get the scores, does a quick tally, and determines where antibiotic resistance falls within the list of public health issues.
3. Overall, most of you have put antibiotic resistance as X in the list. Tell me why you believe it is important. What are your concerns about antibiotic resistance in the near term, say in the next 2-3 years? What about the next 10 years? Why isn't it higher on the list? Do you think that in 10 years it will be higher on the list?

   c. What do you hear from colleagues and fellow physicians about antibiotic use and antibiotic resistance? Is it a subject of conversation when physicians get together? How much of an issue is it for you in your practice?

3. Attitudes and Perceptions of Antibiotics

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a. When you are deciding whether or not to prescribe an antibiotic for a patient, what are some of the factors you consider? (e.g., confidence in diagnosis [viral vs. bacterial infection], side effects associated with antibiotic use, AE risks such as C. diff, public health concerns such as antibiotic resistance)
    i. When patients present with ambiguous symptoms (i.e., ones that could be associated with bacterial or viral infections), do you see prescribing antibiotics for these patients as the safer option than doing nothing?
    ii. How often do adverse events or side effects associated with antibiotic use override the benefit of prescribing the antibiotic?
    iii. When those arise, what are your options for the patient?
b. Do you talk to your patients about the potential adverse events before you decide to prescribe?
    i. Is it more often the patient, or yourself who is concerned about adverse events?
c. How often in the past two months have you spoken to patients about the appropriate use of antibiotics, efficacy, resistance?
d. Have you denied anyone antibiotics in the past two months who wanted them?
    i. Could you walk me through one of those conversations? For instance, if I am your patient, how would you talk to me about this?
    ii. What motivates this discussion?
    iii. How often does the issue of antibiotic overuse, or antibiotic resistance come up in these discussions?
    iv. How long, on average, does this type of discussion take? How much pushback do you receive from patients?

4. Antibiotic Stewardship Definition
    a. Exercise #3

Exercise #3
Please write down on your pad, what antibiotic stewardship means to you. Even if it's not a term you're familiar with, just jot down a sentence about what you believe it means. Moderator will go around the room and have each participant read aloud their definition, if they have one. Moderator will then provide the following definition (verbally and in writing): "Activities that aim to ensure that antibiotics are used only when indicated and, when needed, that the most appropriate antibiotic is prescribed at the right dose and duration of therapy." Question: Do you have any thoughts on that?

    b. Exercise #4

Exercise #4
Moderator will hand out Sheet B

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Questions:

1. Do these data match with your thoughts about antibiotic resistance?
2. What matches what you believe? What is different?
3. Do these points make sense to you as the basic tenets of antibiotic stewardship? Do you think there is anything that shouldn't be these? Anything that is missing?

5. Elements of Antibiotic Stewardship (15 minutes)

a. Exercise #5

Exercise #5

Moderator will hand out modified versions of pages 16-24 of the Centers for Disease Control and Prevention's Core Elements of Outpatient Antibiotic Stewardship (https://www.cdc.gov/antibiotic-use/community/improving-prescribing/core-elements/core-outpatient-stewardship.html).

Questions:

1. I'm going to hand out some pages from the Elements of Antibiotic Stewardship. I know this is quite a bit to go through. If you will please read through this – focus on the bolded sentence and just scan the text below it. As you are reading, circle the phrases or sentences that attract you to the activity, that increase your interest in participating. If you would also cross out any phrases or sentences that you think would present a problem for you, be obstacles or would decrease your interest in the program.
2. For each element, moderator will ask for (1) Overall reaction; (2) What areas did you like – what was circled; (3) What areas did you think were obstacles or that you disliked?

6. Current/Past Stewardship or Quality Improvement Activities (15 minutes)

a. Are you doing any kind of stewardship or quality improvement activities in your practice currently related to antibiotic prescribing or treatment, or any other disease area quality improvement activities?
    i. Describe those to me.
    ii. If no antibiotic related QA activities – probe for other areas of QA activities. In descriptions, include things like data collection, analysis, interpretation, personnel used, outside consulting used, design and implementation of activities, outcomes, cost and funding.
b. In your practice, is there dedicated or protected time to perform quality improvement activities? This is for any area, not just antibiotics.
c. Is there any dedicated expertise on staff for quality improvement activities? (probe if needed: like a data analyst)
d. Is there any dedicated funding for quality improvement activities?
e. What is your motivation for implementing quality improvement activities?

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7. Tools for Adoption of Antibiotic Stewardship (15 minutes)

   a. Exercise #6

Exercise #6
Moderator will hand out Sheet C Questions: 1. On this sheet I have listed a number of the issues we have discussed. I'd like you to think about your own practice and for each of the items, check whether you have access to each potential tool. If you do have access to a tool, please indicated whether you currently use this tool to support antibiotic stewardship activities and make a few notes as to why you do or don't. If you do not have access to a tool, please indicate the level of burden it would be to develop this tool for your practice. 2. Moderator will go around the room and determine the top two or three tools to discuss. 3. For each: What makes this tool such as big burden? What are some ideas you have that might help with this? Do you think it would be a serious impediment to implementing antibiotic stewardship?

8. Policies/Tools to Encourage the Adoption of Antibiotic Stewardship (15 minutes)

   a. Exercise #7

Exercise #7
Moderator will hand out Sheet D Questions: 1. There are a number of potential resources to support your efforts in the appropriate use of antibiotics. I'm going to hand out a list that I'd like you to read. Next to each item in the list is a rating scale of 1 to 5. Please check the box for each resource that describes how motivating each of these is for you. 1 means not at all useful. 5 means very useful. You can use any number in between. When you're done, we'll discuss it. 2. Moderator will collect the ratings and run a quick tally. Discussion will then start with the statement that is most motivating and work down from there. 3. Statement X has the greatest number of you giving it a high score. Those of you that gave it a high score, tell me what about X is the most useful. Are there any problem with it? (Moderator will then continue on for each of the 8 remaining statements.) 4. Is there anything that isn't on this list that you have seen utilized for other quality improvement programs that you think might be effective here?

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b. Realistically, without external aid/requirements, what is the likelihood of your adopting voluntary antibiotic stewardship activities? (defined as having the elements discussed previously: data tracking and reporting, development and implementation of improvement activities, education/training of providers and staff, etc.)
c. Do patient satisfaction scores influence your decision-making around prescribing antibiotics? What kind and how much of an impact do they have?
d. If you wanted to implement antibiotic stewardship activities in your practice, or just improve your antibiotic prescribing, what do you think would be helpful to you?
    i. Toolkits on how to implement antibiotic stewardship interventions?
    ii. Feedback on antibiotic prescribing patterns in your area/practice?
    iii. Incentives from payers?
    iv. Other?

9. Quality Measures for Appropriate Antibiotic Use (10 minutes)

a. Our last subject today is quality measures. How familiar would you say you are with the Healthcare Effectiveness Data and Information Set (HEDIS) published by the National Committee for Quality Assurance (NCQA).
    i. For antibiotics, other disease areas?
    ii. Do you report HEDIS measures related to antibiotic use as part of your quality reporting?
    iii. Do you believe that these measures appropriately capture your antibiotic prescribing practices? Is the HEDIS measure accurate for your practice? (e.g., Bronchitis (adults) and upper respiratory infections (children)) If the participants indicate they do not think these measures accurately capture their prescribing, ask what would be needed for them to trust these data?
b. At your practice, are there direct/individual financial incentives for you – i.e., bonuses – tied to your performance on quality measures (antibiotics or otherwise)? In your opinion, do they work?
c. If antibiotic use quality measures were among the measures you can choose from to report to public (CMS) or private health plans as part of quality reporting requirements, how likely is it that you will select antibiotic quality measures vs. other quality measures?

10. Thank and end group

Sheet A

	Ranking 1-6 1 = most important 6 = least important
A. Overweight and Obesity	
B. Opioid Abuse	
C. Antibiotic Resistance	
D. Misinformation About Childhood Vaccines (pediatricians only)	
E. Diabetes	

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F. Patient Non-Compliance with Drug Regimens	
G. Smoking and Tobacco Use	

Sheet B

According to the CDC, antibiotic resistance is among the greatest public health threats today.

- Leading to an estimated 12 million infections and 23,000 deaths per year in the US.

The most important modifiable risk factor for antibiotic resistance is inappropriate prescribing of antibiotics.

- Approximately half of outpatient prescribing in humans might be inappropriate including:
  - Antibiotic selection
  - Dosing or duration
  - Unnecessary antibiotic prescribing
- Estimates are that at least 30% of outpatient antibiotic prescriptions in the US are unnecessary.

Antibiotic stewardship is the effort

- To measure antibiotic prescribing
- To improve antibiotic prescribing by clinicians and use by patients so that antibiotics are only prescribed and used when needed
- To minimize misdiagnoses or delayed diagnoses leading to underuse of antibiotics
- To ensure that the right drug, dose, and duration are selected when an antibiotic is needed

Sheet C

Potential tools available to use antibiotics more effectively	Currently have access to this	If you have access, are you currently using this tool to support antibiotic stewardship efforts? Why/why not?	If you do not have access, how much of a burden would it be to develop this type of tool for your practice?
1. Timely, Accurate Feedback Reports on Antibiotic Prescribing			☐ Not a burden ☐ Some burden ☐ Large burden

2. Information on antibiotic adverse effects seen in your patients			☐ Not a burden ☐ Some burden ☐ Large burden
3. Reports from electronic health records on antibiotic prescribing practices.			☐ Not a burden ☐ Some burden ☐ Large burden
4. Clinical decision support tools for antibiotic prescribing/ diagnosis aids that leads to antibiotic prescribing			☐ Not a burden ☐ Some burden ☐ Large burden
5. Patient triage system			☐ Not a burden ☐ Some burden ☐ Large burden
6. Access to experts in infectious diseases, pharmacy, quality improvement practices			☐ Not a burden ☐ Some burden ☐ Large burden
7. Access to physician education/ training materials on antibiotic prescribing			☐ Not a burden ☐ Some burden ☐ Large burden
8. Access to materials for patient education on appropriate use of antibiotics			☐ Not a burden ☐ Some burden ☐ Large burden

Sheet D

Potential feedback loops on antibiotic use	1 Not at all useful	2	3	4	5 Very useful
1. If you received a letter from state department of health or health plan notifying your that you or your practice is a “high prescriber” of antibiotics when compared to other providers in your state/region					
2. If private health plans create a stand-alone quality incentive program for antibiotic stewardship					

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3. If private health plans include antibiotic stewardship as a “menu item” for a quality incentive program					
4. If your state publicly recognizes practices/individuals that have demonstrated most appropriate antibiotic prescribing					
5. If your state publicly publishes results of quality measures for appropriate antibiotic use for all practice locations					
6. If your state department of health publishes aggregate data on the volume of outpatient antibiotic prescribing in your state					
7. If your state publicly reports “high prescribing” practices					
8. If you received a report card from state department of health or health plans that measure the rates of antibiotic adverse events for your patients compared to other providers in your state/region					
9. If you received a report card from state department of health or health plans on quality measures for antibiotics when compared to other providers in your state/region					

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Primary Care Physicians' Attitudes and Perceptions toward Antibiotic Resistance and Outpatient Antibiotic Stewardship in the United States: A Qualitative Study

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Title: Primary Care Physicians' Attitudes and Perceptions toward Antibiotic Resistance and Outpatient Antibiotic Stewardship in the United States: A Qualitative Study

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Keywords: antibiotic resistance, antibiotics, antimicrobial stewardship, primary care, qualitative research

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Abstract:

Objectives: At least 30% of outpatient antibiotic prescriptions are unnecessary. Outpatient antibiotic stewardship is needed to improve prescribing and address the threat of antibiotic resistance. A better understanding of primary care physicians' (PCPs) attitudes towards antibiotic prescribing and outpatient antibiotic stewardship is needed to identify barriers to stewardship implementation and help tailor stewardship strategies. The aim of this study was to assess PCPs' current attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and the feasibility of outpatient stewardship efforts.

Design: Eight focus groups with PCPs were conducted by an independent moderator using a moderator guide. Focus groups were audio-recorded, transcribed, and coded for major themes using deductive and inductive content analysis methods.

Setting: Focus groups were conducted in 4 U.S. citities: Philadelphia, Birmingham, Chicago, and Los Angeles.

Participants: Two focus groups were conducted in each city – one with family medicine and internal medicine physicians and one with pediatricians. A total of 26 family medicine/internal medicine physicians and 26 pediatricians participated.

Results: Participants acknowledged that resistance is an important public health issue, but not as important as other pressing problems (e.g., obesity, opioids). Many considered resistance to be more of a hospital issue. While participants recognized inappropriate prescribing as a problem in outpatient settings, many felt that the key drivers were non-primary care settings (e.g., urgent care clinics, retail clinics) and patient demand. Participants reacted positively to stewardship efforts aimed at educating patients and clinicians. They questioned the validity of antibiotic prescribing metrics. This skepticism was due to a number of factors, including the feasibility of

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capturing prescribing quality, a belief that physicians will "game the system" to improve their measures, and dissatisfaction and distrust of quality measurement in general.

Conclusions: Stakeholders will need to consider physician attitudes and beliefs about antibiotic stewardship when implementing interventions aimed at improving prescribing.

Strengths and limitations of this study

- This study presents new data on U.S.-based primary care physicians' attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and outpatient antibiotic stewardship approaches.
- Eight focus groups with internal medicine physicians, family medicine physicians, and pediatricians were held in four geographically-dispersed U.S. cities, which allowed for a wide-range of viewpoints to be represented in the dataset.
- The focus groups did not include some types of clinicians that provide primary care in the U.S. (e.g., nurse practitioners, physician assistants).
- Although physicians from across the U.S. were included in this study, the small sample size limits the generalizability of these findings.

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Introduction

Antibiotic resistance poses a growing threat to public health and antibiotic use is a primary driver of the development of resistant bacteria. In the United States, the majority of antibiotics used in humans are prescribed in outpatient healthcare settings.[1] Considering the volume of antibiotics prescribed and data from other countries, ambulatory antibiotic prescribing likely accounts for 80-90% of all antibiotic prescribing.[2,3]

There were 270.2 million outpatient antibiotic prescriptions dispensed in 2016.[4] While this represents a 5% decrease since 2011, prescribing rates have been relatively stable from 2014-2016.[4] Previous studies have found that a significant proportion of outpatient antibiotic prescriptions are inappropriate.[5-9] Many of these inappropriate prescriptions were for acute respiratory conditions that often do not require antibiotics.[5,7,8]

In order to improve antibiotic prescribing in primary care offices and other outpatient healthcare settings, the Centers for Disease Control and Prevention (CDC) published core elements of outpatient antibiotic stewardship, highlighting steps that stakeholders can take in support of stewardship efforts.[10] However, additional work is needed to ensure outpatient stewardship efforts are expanded nationwide. A better understanding of physicians' attitudes towards antibiotic prescribing and their perceptions on the feasibility and impact of stewardship interventions would identify barriers to stewardship implementation in U.S. ambulatory settings and would allow stakeholders to better tailor strategies to improve prescribing.

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Previous research has evaluated what drives inappropriate antibiotic prescribing in healthcare settings. These studies, although evaluating physician populations in differing countries, have found some consistent themes. Many studies, including those from the U.S and Europe, have shown that physicians consider patient demand and prescribing of other physicians to be primary drivers of inappropriate antibiotic prescribing.[11-25] In order to counteract these drivers of inappropriate prescribing, physicians have highlighted a need for improved public education around antibiotic resistance and the need for appropriate prescribing.[20-23,26] Additionally, studies from U.S. and European countries have shown that physician time constraints, fear of undertreating patients due to diagnostic uncertainty, and certain clinical factors are also seen as drivers of inappropriate prescribing.[11-13,15-17,19-21,23,24,27,28]

Studies have also found that physicians do not necessarily see the impact of antibiotic resistance in their daily practice. Two interview-based studies of primary care clinicians in the UK and Europe showed a general recognition that antibiotic resistance is an important issue, but many were less concerned about resistance in their daily practice.[29,30] A systematic review of studies from different countries found a similar dynamic.[26] However, a U.S.-based qualitative study did find that, while physicians did not commonly mention antibiotic resistance as a factor when making prescribing decisions, some did express concerns about the availability of antibiotics in the future.[11]

Expanding upon this research to gain a better understanding of current attitudes about antibiotic prescribing and the perceived impact of different antibiotic stewardship approaches among U.S. outpatient physicians is needed. This is especially true for primary care physicians (PCPs) given

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that they account for the largest proportion of outpatient antibiotic prescriptions (38%) in the United States.[31]

In the United States, primary care services are often provided by family medicine physicians, internists, and pediatricians.[32] The provision of these services can be fragmented. Many patients do not receive extended primary care services and after-hours care from their usual primary care offices.[33] Additionally, PCPs in the U.S. receive payment for their services from a range of commercial and public payers,[32] all of which frequently measure the quality of care to determine reimbursement levels. All of these factors have the potential to influence U.S. PCPs' views on antibiotic prescribing and approaches to improving antibiotic use in outpatient settings.

In order to assess these attitudes and perceptions and inform strategies for antibiotic stewardship tailored to U.S. outpatient settings, we conducted a series of semi-structured focus groups among PCPs in the United States.

Methods

Study Design

We conducted eight focus groups in November and December of 2017 with PCPs in four U.S. cities – Philadelphia, PA; Birmingham, AL; Chicago, IL; and Los Angeles, CA. Focus groups were chosen for this study to allow for open discussion amongst participants and to allow for

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different opinions and debate. This allows both for the identification of areas where there is dissension and broad consensus during the analysis process, and adds further complexity to the themes.

The four cities were selected to represent each of the four U.S. Census regions in order to account for any potential differences in attitudes based on geographic region. Research has shown a clear difference in overall outpatient antibiotic prescribing rates by geographic region in the U.S., with individuals in Southern states prescribed antibiotics at higher rates than those in any other part of the country.[4,31] For example, in 2017 the antibiotic prescribing rate in West Virginia (the state with the highest rate) was more than double that of Alaska (the state with the lowest rate).[31] Additionally, many primary care physicians in the U.S. specialize in family medicine, internal medicine, or pediatrics.[32] As such, two focus groups were conducted in each city – one with family medicine and internal medicine physicians and one with pediatricians.

A screening questionnaire was developed to recruit participants. Inclusion criteria included self-report of board certification in pediatrics, family medicine, or internal medicine; being a full-time physician primarily practicing in an outpatient office setting; spending ≥ 50% of medical practice time in direct patient care; and fluency in English. Participants were excluded if they reported being > 65 years-old; board-certified in a subspecialty outside of primary care; or an employee or paid consultant of any of the following organizations: a pharmaceutical, medical device, or biotechnology company, an advertising or healthcare marketing company, or a governmental or regulatory agency.

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Study participants were recruited by M3 Global Research, a medical market research firm. Participants were initially recruited from a panel of healthcare professionals maintained by M3. For three cities – Chicago, Birmingham, and Los Angeles – additional participants were recruited from physician panels maintained by local partners to ensure adequate participation. Individuals located within a 30-mile radius of each focus group facility were contacted by telephone or online and screened for participation in this study. Any participant recruited online received a follow-up call from M3 to confirm their eligibility.

Each focus group lasted between 1.5 and 2 hours and was moderated by the same independent moderator with experience in qualitative research. Prior to each focus group, participants received an informed consent form to review and sign. All participants signed the informed consent form. Each participant received $400 to compensate for their time.

The study protocol was reviewed for ethical considerations and deemed exempt by the Chesapeake IRB (now known as Advarra). The Standards for Reporting Qualitative Research reporting guidelines were used in the reporting of study findings (see supplementary file #1).[34]

Data Collection and Analysis

The study team and the external moderator developed a semi-structured moderator guide (see supplementary file #2). This guide aimed to draw out issues identified based on previous research – such as perceptions of antibiotic resistance and drivers of inappropriate prescribing,

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including patient demand – as well as explore new areas, such as the perceived impact of different stewardship strategies. The guide began by asking participants to rank a number of public health issues in terms of importance in their daily practice. These issues included excess body weight and obesity, antibiotic resistance, misinformation about childhood vaccines (pediatricians only), opioid abuse, diabetes, patient non-compliance with drug regimens, and smoking/tobacco use.

The guide then asked questions aimed at understanding the physicians' attitudes and perceptions around antibiotic use and stewardship, including factors that influence their antibiotic prescribing decisions and if/how they communicate with patients about these decisions. They were also given handouts that defined and provided examples of the CDC's Core Elements of Outpatient Antibiotic Stewardship.[10] These handouts were used to gauge perceptions on the feasibility and impact of the core elements and associated activities.

Finally, participants were asked for feedback on activities that encourage antibiotic stewardship implementation and resource availability to do so. Respondents provided opinions on the feasibility and effectiveness of example policies and activities that could be implemented by healthcare stakeholders to encourage stewardship implementation. To assess resource availability, participants were asked to provide feedback on current access to certain tools to support antibiotic stewardship efforts, such as feedback reports on antibiotic prescribing practices or access to patient education materials and, if not, how much of a burden it would be to obtain access.

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All focus groups were audio and video-recorded, transcribed (using the audio recording), and the transcripts were coded for major themes in NVivo 11 (QSR International). Common themes were identified by three study authors (RZ, AS, DH), using both deductive and inductive content analysis methods.[35,36] We applied the following steps for analyzing the transcripts. First, reesarchers (RZ, DH) familiarized themselves with the data by observing all eight focus groups. Next, an initial list of themes was developed based on (1) a review of past studies on the topic of antibiotic resistance and stewardship in outpatient settings [11-18,37,38] and (2) the data familiarization process. These themes were independently applied to the transcripts and coded by two authors (RZ, AS) and reviewed by another author (DH). During this process, new themes were identified through further review of the transcripts and some of the initial themes were modified. Any disagreement in coding was discussed until consensus was met. Coding was considered complete once theoretical saturation was reached and no additional themes could be identified.[36]

Patient and Public Involvement

This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Results

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A total of 52 PCPs – 26 family medicine and internal medicine physicians and 26 pediatricians – accepted the invitation and participated in the focus groups. No demographic information was collected for these particpiants.

A number of common themes were identified across these focus groups that illustrated attitudes on the following topics: (1) antibiotic resistance as a public health issue, (2) drivers of antibiotic prescribing, (3) the acceptability of antibiotic stewardship interventions – patient and physician education, and (4) acceptability of performance reporting. Themes within each of these areas are highlighted below, along with areas of disagreement among participants where appropriate.

Antibiotic Resistance as a Public Health Issue

The initial discussions within each focus group centered on what participants thought about antibiotic resistance as a public health issue. Two themes were seen across focus groups – antibiotic resistance was seen as less of a priority than other public health issues faced by participants and antibiotic resistance was considered an issue for their patient population (Table 1).

Antibiotic resistance seen as less important than other public health issues

A common theme among focus group participants was the perception of antibiotic resistance being less important in their daily practice when compared with other public health issues they commonly faced, such as obesity, diabetes, and opioid misuse.

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Antibiotic resistance is an issue, but not for my patient population

While many participants acknowledged that antibiotic resistance is a concern, many did not see it as an issue that impacted their patients or their daily practice. Instead, most participants considered antibiotic resistance as something affecting sicker, hospitalized patients. In contrast, some participants acknowledged that they have seen an increase in resistant infections in their patients with urinary tract infections or skin infections. However, these particpants still classified resistance as an issue largely impacting inpatient medicine.

Drivers of Antibiotic Prescribing

Particpiants in all focus groups also discussed what they thought was driving outpatient antibiotic prescribing. Two themes emerged: (1) participants argued that other physicians were the ones driving inappropriate prescribing, and, (2) patient demand for antibiotics continues to be an issue in primary care (Table 2).

Attribution of inappropriate antibiotic prescribing to others

Participants indicated that they believed inappropriate outpatient antibiotic prescribing is largely driven by clinicians other than themselves, namely those practicing in urgent care offices and retail clinics. This contributed to the feeling that resisting patient demand for antibiotics is futile, as patients can simply see another clinician and get what they want. Participants also said that patients' past experiences of receiving antibiotics from another clinician reinforced patient expectations for antibiotics for the same complaint. This, in their mind, strengthens patient resolve to demand antibiotics.

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Patient demand as a driving factor

When discussing drivers of antibiotic prescribing habits, a common theme was the pressure participants said they experience from patients who the prescribers perceive to expect antibiotics even when not medically indicated. Participants often returned to this theme throughout the focus group discussions. Participants contended that patients often feel entitled to leave a visit with a material treatment – often an antibiotic - after spending time and money at a doctor's office. Participants argued that patient pressure is compounded by the use of patient satisfaction scores when grading physician performance. They expressed concern that, if they refused to prescribe an antibiotic for a patient who expected one, that the patient might write a negative review and/or score the physician poorly.

However, it is important to note that some participants indicated that the impact of patient expectations for antibiotics on their prescribing decisions can vary. For example, some participants indicated that they may be more willing to push back against prescribing an antibiotic if they have a long-standing relationship with a patient. This was more common among pediatricians as many of them indicated they have many opportunities to interact with patients and their parents during well child visits, making it easier for them to discuss why an antibiotic is or is not needed with parents.

Acceptability of Antibiotic Stewardship Interventions – Patient and Physician Education

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On the topic of antibiotic stewardship efforts focused on patient and physician education, participants primarily indicated support for these activities (Table 3).

Need for patient education

Consistent with the perception of patient demand for antibiotics generating concern, participants emphasized that, in order for them to be able to effectively do their jobs, their patients need to be educated about when antibiotics are and are not appropriate and why judicious antibiotic use is critical to combating antibiotic resistance. Participants suggested several approaches for educating the public, including written education materials in different languages, educational videos for waiting rooms, and direct-to-consumer advertisements. Finally, many physicians emphasized the need to provide education in advance of a patient visit. By the time a patient is at a doctor's office for an illness, many felt it was too late to change patient expectations.

Acceptability of physician education

Many participants indicated that physician education would also be a welcome approach for outpatient antibiotic stewardship. Participants described educational efforts as more helpful for physicians compared to other interventions, such as providing feedback on prescribing practices, which was viewed as more critical of physicians. For example, participants indicated that training in how to communicate antibiotic prescribing decisions to patients would be helpful. One area of disagreement emerged around whether this education should be mandatory or voluntary. A few participants mentioned that requiring outpatient physicians to complete continuing medical education (CME) on antibiotic use – similar to requirements for CME around

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opioid prescribing – may be helpful. However, other participants indicated that they would prefer voluntary rather than mandatory CME.

Acceptability of Performance Reporting

When presented with examples of stewardship efforts aimed at measuring and providing feedback on antibiotic prescribing practices, physicians were less supportive compared to educational efforts. A number of themes emerged in this area – both themes specific to antibiotic prescribing measurement, as well as themes regarding quality measurement efforts more broadly (Table 4).

Feasibility of measuring antibiotic prescribing

Participants expressed concerns about antibiotic stewardship activities focused on measuring inappropriate antibiotic use, questioning the feasibility of assessing prescribing quality while accounting for different patient populations. Some participants indicated that developing antibiotic use reports would likely require significant financial and time investments. Many participants argued that antibiotic use measures are unlikely to capture all of the clinical elements from an office visit to provide the full context behind an antibiotic prescription, and that setting standards for the quality of antibiotic use would be difficult. Some questioned who would be qualified to set these standards and how that might impact the accuracy and fairness of antibiotic use measures.

Belief that physicians will "game the system"

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Participants also argued that, if antibiotic use measures were developed and implemented, other physicians would simply use the rules put in place to manipulate the desired outcome (i.e., "game the system") to improve their antibiotic prescribing scores. Some participants indicated that physicians could easily identify what diagnosis codes they were being measured on and shift coding practices to more antibiotic-appropriate conditions.

Dissatisfaction with the quality measurement system

Many participants also expressed dissatisfaction and general distrust of quality measurement systems and reporting processes. Participants expressed a sense of feeling over-measured and being blamed for things beyond their control. Participants argued that quality measures assume that medicine is black and white and do not account for their need to use clinical judgment when treating patients. Some expressed concern that any new measure could eventually be turned around and used against them. Examples mentioned in different focus groups included using quality measures as a way to reimburse physicians at a lower level or a reason to fire a physician.

Distrust of tracking and reporting systems

Finally, participants described issues that they have experienced with the inaccuracy of tracking and reporting systems. For example, participants indicated that they often receive feedback reports that include patients that they have not seen in years, or feedback reports with clear coding errors. These inaccuracies lead them to generally dismiss the utility of these reports.

Discussion

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We conducted focus groups with PCPs to assess their knowledge and attitudes towards antibiotic resistance, inappropriate antibiotic prescribing, and outpatient antibiotic stewardship approaches. While participants recognized the public health importance of antibiotic resistance and antibiotic use, they felt these issues were less important compared to other public health priorities in outpatient care. This finding echoes past research,[26,29,30] and adds further insight by placing antibiotic resistance within the broader context of public health issues encountered in primary care. Our participants consistently identified antibiotic resistance as a lower priority for their practice compared to other health concerns. This is consistent with what has been shown in hospital-based studies, with one Swedish study identifying a lack of recognition of antibiotic resistance as an imminent threat as a barrier to stewardship.[39]

Additionally, most study participants felt they were already good antibiotic stewards, but that their efforts were hindered by patient demand for antibiotics and the prescribing practices of other physicians. These findings are consistent with previous research on perceptions of drivers of outpatient antibiotic prescribing.[11-25] In particular, the perception of patient demand as a driving force behind inappropriate prescribing practices continues to be a consistent finding across studies both in the U.S. and other countries. Similar perceptions have also been documented among inpatient physicians who believe that prescibers outside of hospitals are primarily responsible for antibiotic overuse and antibiotic resistance, underscoring the value for individual feedback on prescribing patterns to help these physicians recognize the need for antibiotic stewardship in their practice.[40] This indicates a continued need for stewardship efforts to address these concerns moving forward.

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Along those lines, participants in our study reacted positively to education-focused stewardship activities – particularly those activities aimed at educating the general public. Participants were also supportive of education targeting physicians, such as trainings on how to best communicate antibiotic prescribing decisions with patients. Previous studies from both Europe and the U.S. have shown physicians are receptive to educational efforts – ranging from national media campaigns to educating children in schools about antibiotics.[15,16,21,26] Additionally findings from inpatient studies also suggest treatment guidelines can be an impactful educational tool for changing prescribing behaviors.[41,42]

In contrast to educational efforts, our study participants remained unconvinced about the utility of antibiotic use tracking and reporting as a stewardship strategy. Participants' negative attitudes regarding the feasibility of measuring the quality of antibiotic use in an accurate or fair manner, and their distrust of the quality measurement system in the U.S. in general factored into participants' perceptions on the impact of antibiotic use measurement. A previous U.S. study evaluating pediatrician perceptions of an intervention that included audit and feedback of antibiotic prescribing practices found high skepticism among physicians about the quality and accuracy of the feedback reports.[12] However, while physicians remain hesitant about the approach of tracking and reporting antibiotic use, studies from the U.S. and U.K. have shown that this stewardship approach is effective at reducing inappropriate prescribing.[43-47]

Additional studies have evaluated physician perceptions of broader quality measurement systems. One study of U.S. physicians in three states found that 71% felt that pediatric quality reports were effective at improving pediatric care.[48] However, in interviews with providers in

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two of these states, authors found that physicians were frustrated with certain aspects of the quality reports, such as the inclusion of measures that they felt were outside of their control.[48] A 2009 survey of U.S. physicians on perceptions of Medicare's Physician Quality Reporting Initiative (PQRI) found that 50% of physicians participating in PQRI programs believed it had no impact on quality of care.[49] By comparison, qualitative studies in the U.K. have shown that the national pay-for-performance program has been mostly well received by the general practitioners.[50,51] However, some concerns remain over reduced clinical autonomy, perceptions of micromanagement, and skepticism of the validity of certain quality indicators. While these studies demonstrate that negative perceptions remain around financial incentive mechanisms, another study did find that how antibiotic use incentives are framed could be impactful – specifically framing these efforts as addressing harms to patients.[52]

Many of our findings are consistent with research on self-enhancement bias—that people take full credit for their success but are quick to dismiss failures as caused by external factors.[53,54] Self-enhancement is adaptive because it protects against being discouraged or down on one's self, preserves a person's self-image, and keeps them motivated to work and thrive in their life. This may explain findings from our focus groups, including: (1) the physicians' belief that patients' antibiotic knowledge deficits and other clinicians' behaviors were key drivers of overprescribing, and (2) their defensive responses when confronted with the potential for reports of their own prescribing by questioning the validity of the measurement enterprise. These perceptions present a challenge when addressing inappropriate antibiotic prescribing. Some approaches that have been successful in reducing antibiotic overprescribing invert the problem of self-enhancement by using it as a way to encourage or reward appropriate prescribing. These

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interventions engender reputational concerns when antibiotics are used or make explicit social comparisons of performance with others to encourage pursuit of a positive self-image (e.g., the prospect of becoming a "top performer") through lower prescribing.[55,56]

This study provides important insight into current attitudes of primary care physicians in the United States on issues related to antibiotic resistance, inappropriate antibiotic prescribing, and antibiotic stewardship implementation. Enhanced understanding of perceptions amongst these providers is critical as healthcare stakeholders work to expand stewardship activities into primary care settings. Two of the four core elements for outpatient antibiotic stewardship are tracking and reporting antibiotic prescribing practices, and the provision of education and access to expertise on antibiotic prescribing.[10] While our study shows support from PCPs for educational initiatives, more work will be needed to address PCP concerns related to tracking and reporting antibiotic use. Healthcare stakeholders will need to work to build trust among the PCP community around antibiotic prescribing feedback, and will need to identify ways to make the feedback provided to physicians actionable to help ensure impact.

Another important barrier to expanded stewardship implementation identified by this study is a continued lack of prioritization of this issue amongst PCPs. Healthcare stakeholders – including public health authorities, health plans, and health systems – will need to identify ways to incentivize stewardship uptake in primary care practices in the U.S.

By conducting focus groups in cities across the U.S. and with internists, family medicine physicians, and pediatricians, we were able to gather data from a wide-range of perspectives. The

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consistent themes identified throughout the focus groups suggest that barriers to stewardship implementation may be similar across the United States.

This study also has limitations. Because this is a qualitative study with a small sample size, these findings cannot be generalized to the broader U.S. PCP population or to general practitioners in other countries. Participants were drawn from physician databases maintained for research purposes. Physicians who were recruited and who participated in these focus groups may have different or stronger opinions than those who did not. Additionally, as we recruited physicians from cities in each of the four U.S. Census regions, it is possible that views and perceptions of PCPs from rural practices were underrepresented in this study. Finally, this study evaluated physicians who specialized in family medicine, internal medicine, or pediatrics. We did not include other primary care clinicians, such as nurse practitioners or physician assistants. Additional research will be needed to assess whether these findings are applicable to the broader primary care clinician community.

In conclusion, the findings from these focus groups show that more work is needed to elevate the issue of antibiotic resistance and the need for improved prescribing among PCPs in the U.S. Additionally, current skepticism among PCPs about the feasibility and accuracy of antibiotic use measurement may create concern around interventions that rely solely on tracking and reporting prescribing. It will be important to address these perceptions when designing interventions aimed at decreasing inappropriate antibiotic prescribing in outpatient settings.

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Conflict of Interest

Dr. Linder, Dr. Gerber, and Dr. Doctor all received honoraria for time dedicated to this research project. Dr. Doctor has received consultant fees from Precision Health Economics and University of Pennsylvania Health System. Dr. Doctor was supported by grants from the National Institutes of on Aging (R21AG057395, R21AG057400, R21AG057396, R21AG057383, P30AG024968, R33AG057395), the National Institute on Drug Abuse (R01 DA046226), the National Institute of Arthirist and Musculoskeletal Conditions (R01 AR073486), the Agency for Healthcare Research and Quality (R01 HS026506) and the Patient-Centered Outcome Research Institute (CDRN-1306-04864). Dr. Linder was supported by grants from the National Institute on Aging (R21AG057400, R21AG057396, R21AG057383, R21AG057395), Agency for Healthcare Research and Quality (R01HS024930, R01HS026506), The Peterson Center on Healthcare, and a contract from the Agency for Healthcare Research and Quality (HHSP2332015000201).

Contributors' Statement

Ms. Zetts led the development of the study concept and design, participated in the analysis and interpretation of data, and drafted the manuscript.

Ms. Stoesz participated in the analysis and interpretation of data and provided critical revision of the manuscript.

Ms. Garcia provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Doctor provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Gerber provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Linder provided input in the development of the study concept and design, participated in the interpretation of data, and provided critical revision of the manuscript.

Dr. Hyun provided supervision in the development of the study concept and design, participated in the analysis and interpretation of data, and provided critical revision of the manuscript.

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Table 1. Themes and quotations from primary care physicians regarding antibiotic resistance as a public health issue

Themes	Quotations
Antibiotic resistance seen as less important than other public health issues faced by primary care physicians	(1) "We are seeing some MRSA. Everybody does. It is just so low on the totem pole compared to the other things that we are seeing. – Birmingham, family medicine/internal medicine physician (2) "It's important, but in everyday practice I thought that other things were more important." – Chicago, pediatrician
Antibiotic resistance is an issue, but not for my patient population	(1) "I thought about antibiotic resistance as more of a problem, not in my practice that much, but in a hospital with a very sick person where they can't find something because somebody's resistant." – Chicago, pediatrician (2) "It's not like I'm seeing my patients having an issue on a regular basis like these other things are. There's this threat of this crazy super bug that will take over the world and kill us all, but I've never – it doesn't seem like reality. – Philadelphia, family medicine/internal medicine physician (3) "We're starting to see it in the community. I think if you had a table full of infectious disease doctors working in intensive care units, you would have different priorities. But in the outpatient, we probably see it less […] It is a matter of time before we see it more. Who knows, a year, two, three from now, these numbers might be different." – Philadelphia, family medicine/internal medicine physician

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Table 2. Themes and quotations from primary care physicians regarding drivers antibiotic prescribing

Themes	Quotations
Attribution of inappropriate antibiotic prescribing to others	(1) "I think those of us who have our own practice and control of things probably […] 'get it' more than the hourly non-vested person in your walk-in clinics who are just basically drawing an hourly salary and their whole interest is in just getting rid of somebody." – Birmingham, family medicine/internal medicine physician (2) "We're always practicing evidence-based medicine, so it becomes incredibly challenging. With adult medicine, they'll give out antibiotics over the phone, antibiotics without doing swabs and chest X-rays, things like that, or even seeing the patient." – Chicago, pediatrician (3) "A lot of us don't like to prescribe antibiotics, but they go to urgent cares and they go to […] one-minute clinics and they get prescribed antibiotics." – Los Angeles, family medicine/internal medicine physician
Patient demand as a driving factor	(1) "We're under pressure all day. You don't want to get written up, potentially, for being insensitive, or not taking care of them, or physician ratings." – Birmingham, pediatrician (2) "They come in and it's a boxing match. You are fighting in that corner with the misconception, preconceived notion and you're trying to tell them that 2 + 2 = 4 and they are saying, "No, it's purple". – Birmingham, family medicine/internal medicine physician (3) "Sometimes you just like, you know what, I'm beaten down; so, here's your Z-Pak. See you. Next patient. I'm not going to sit here and argue with somebody for five minutes over why they don't need it." – Philadelphia, family medicine/internal medicine physician

Table 3. Themes and quotations from primary care physicians regarding patient and

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physician education as antibiotic stewardship activities

Themes	Quotations
Need for patient education	(1) "It will not work unless you educate the population. You cannot attack the doctors and curtail what they are doing until you educate patients that your doctor is doing the right thing." – Birmingham, family medicine/internal medicine physician (2) "I think it's more education. I think you could probably do more with a commercial than you can with anything else." – Chicago, pediatrician
Acceptability of physician education	(1) "Parents are going to ask. They don't know what's right or wrong. They're not medically trained. It's the physicians that need more education about not prescribing." – Chicago, pediatrician (2) "I think the best education strategy we could get and maybe there could be a study done is how, what is the best way to communicate to patients that antibiotic overprescribing and resistance is a problem and that rings true to them, that we can tell them this and they're going to understand that and accept the fact that it didn't lead to antibiotics." – Los Angeles, family medicine/internal medicine physician

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Table 4. Themes and quotations from primary care physicians regarding the acceptability of performance reporting

Feasibility of measuring antibiotic prescribing	(1) "Like I said, you'll get patients who were seen within hours by 2 different people, and one gives the antibiotic and the other one doesn't. It's not necessarily that the person who doesn't give it is always right, and the other one's always wrong. It's too subjective." – Chicago, pediatrician (2) "There's more thought process into the physician having to, there's a reason basically why a physician chooses or not chooses to, the management specifically. So, until they actually come and look at our, the history, the physical, and overall clinical management, they really will not know why we prescribed the way we did it." – Los Angeles, family medicine/internal medicine physician
Belief that physicians will "game the system"	(1) "As soon as you start having measurements like that, you're going to have a lot more diagnoses of walking pneumonia or pneumonia." – Los Angeles, family medicine/internal medicine physician (2) "People don't put down accurate diagnoses, and then when you have something like this, then everyone is going to start gaming the system. 'I'm not going to put down diagnosis of bronchitis. No, I'm going to put sinusitis.' Even through it's bronchitis, I can give you the antibiotic and not get dinged for it." – Philadelphia, family medicine/internal medicine physician
Dissatisfaction with the quality measurement system	(1) "These days we're all getting measured on everything. Every time we click a button on the EMR whether it's diabetes, cholesterol, blood pressure, antibiotic prescribing, no matter what it is someone's measuring it. Someone's telling us what we should be doing. I think, I'll speak for myself; physicians are starting to get tired of being told what to do." – Philadelphia, family medicine/internal medicine physician (2) "That's going to fall into a P for P program. A payment for performance which is the insurance company's way of paying doctors less money." – Los Angeles, pediatrician (3) "We've discovered that they don't work very well, and then, almost always if there's an incentive for doing something, there's going to be a punishment for not doing it. There's never just the incentive." – Birmingham, pediatrician
Distrust of tracking and reporting systems	(1) "For example, I vaccinate every kid that comes to see me with Menactra [...] [Insurance company] recently said that I did not get 23 kids, but when I go to the state registry, every single one of those kids got their Menactra, before the age of 13. Their data collection practices are questionable and manipulable, and I don't trust it." – Birmingham, pediatrician

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	(2) “The quality of the data seems always so poor […] I have patients that I’ve never seen that are on my list, I had a patient that was dead for 2 years that was on my list. So the quality of the data collection and how you’re going to do that is so important.” – Los Angeles, family medicine/internal medicine physician

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Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the SRQRreporting guidelines, and cite them as:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-1251.

		Reporting Item	Page Number
Title			
	#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1
Abstract			
	#2	Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions	2-3
Introduction			
Problem formulation	#3	Description and signifcance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	4-6

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Purpose or research question	#4	Purpose of the study and specific objectives or questions	6
Methods			
Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenolgy, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	6-7, 20
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	7
Context	#7	Setting / site and salient contextual factors; rationale	6-7
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	6-7
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	8
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative	8-9

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		process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	8-9
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	7, 10
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	9
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	9
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	9
Results/findings			
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	10-16
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	26-30
Discussion			
Intergration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application /	16-18

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		generalizability; identification of unique contributions(s) to scholarship in a discipline or field	
Limitations	#19	Trustworthiness and limitations of findings	19-20
Other			
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were managed	20-21
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	20

None The SRQR checklist is distributed with permission of Wolters Kluwer © 2014 by the Association of American Medical Colleges. This checklist can be completed online using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai

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Supplementary File #2

Antibiotic Stewardship Moderator's Guide

Modified format for manuscript submission

1. Introduction
   a. Background: mirrors, taps
   b. Introduction of moderator, participants: name, years in practice, practice size, practice ownership (physician vs. hospital-owned), personal ownership status (i.e., employee vs. full/part owner)

2. Perceived Importance of Antibiotic Resistance as a Public Health Issue
   a. As physicians, you confront a myriad of public health issues that impact you and your patient care daily. I want to discuss some of those issues, so I can understand where your areas of greatest concerns are focused.
   b. Exercise #1

Exercise #1

Moderator will hand out Sheet A with the listing the following topics:

- Overweight and obesity
- Antibiotic resistance
- Misinformation about childhood vaccines (pediatricians only)
- Opioid abuse
- Diabetes
- Patient non-compliance with drug regimens
- Smoking and tobacco use

Questions

1. On your sheet, would you please rank the public health issue from most important to least important? Put a 1 next to the most important, 2 for the next most important, etc. to the least important of these topics.
2. Moderator goes around the room to get the scores, does a quick tally, and determines where antibiotic resistance falls within the list of public health issues.
3. Overall, most of you have put antibiotic resistance as X in the list. Tell me why you believe it is important. What are your concerns about antibiotic resistance in the near term, say in the next 2-3 years? What about the next 10 years? Why isn't it higher on the list? Do you think that in 10 years it will be higher on the list?

   c. What do you hear from colleagues and fellow physicians about antibiotic use and antibiotic resistance? Is it a subject of conversation when physicians get together? How much of an issue is it for you in your practice?

3. Attitudes and Perceptions of Antibiotics

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a. When you are deciding whether or not to prescribe an antibiotic for a patient, what are some of the factors you consider? (e.g., confidence in diagnosis [viral vs. bacterial infection], side effects associated with antibiotic use, AE risks such as C. diff, public health concerns such as antibiotic resistance)
    i. When patients present with ambiguous symptoms (i.e., ones that could be associated with bacterial or viral infections), do you see prescribing antibiotics for these patients as the safer option than doing nothing?
    ii. How often do adverse events or side effects associated with antibiotic use override the benefit of prescribing the antibiotic?
    iii. When those arise, what are your options for the patient?
b. Do you talk to your patients about the potential adverse events before you decide to prescribe?
    i. Is it more often the patient, or yourself who is concerned about adverse events?
c. How often in the past two months have you spoken to patients about the appropriate use of antibiotics, efficacy, resistance?
d. Have you denied anyone antibiotics in the past two months who wanted them?
    i. Could you walk me through one of those conversations? For instance, if I am your patient, how would you talk to me about this?
    ii. What motivates this discussion?
    iii. How often does the issue of antibiotic overuse, or antibiotic resistance come up in these discussions?
    iv. How long, on average, does this type of discussion take? How much pushback do you receive from patients?

4. Antibiotic Stewardship Definition
    a. Exercise #3

Exercise #3
Please write down on your pad, what antibiotic stewardship means to you. Even if it's not a term you're familiar with, just jot down a sentence about what you believe it means. Moderator will go around the room and have each participant read aloud their definition, if they have one. Moderator will then provide the following definition (verbally and in writing): "Activities that aim to ensure that antibiotics are used only when indicated and, when needed, that the most appropriate antibiotic is prescribed at the right dose and duration of therapy." Question: Do you have any thoughts on that?

    b. Exercise #4

Exercise #4
Moderator will hand out Sheet B

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Questions:

1. Do these data match with your thoughts about antibiotic resistance?
2. What matches what you believe? What is different?
3. Do these points make sense to you as the basic tenets of antibiotic stewardship? Do you think there is anything that shouldn't be these? Anything that is missing?

5. Elements of Antibiotic Stewardship (15 minutes)

a. Exercise #5

Exercise #5

Moderator will hand out modified versions of pages 16-24 of the Centers for Disease Control and Prevention's Core Elements of Outpatient Antibiotic Stewardship (https://www.cdc.gov/antibiotic-use/community/improving-prescribing/core-elements/core-outpatient-stewardship.html).

Questions:

1. I'm going to hand out some pages from the Elements of Antibiotic Stewardship. I know this is quite a bit to go through. If you will please read through this – focus on the bolded sentence and just scan the text below it. As you are reading, circle the phrases or sentences that attract you to the activity, that increase your interest in participating. If you would also cross out any phrases or sentences that you think would present a problem for you, be obstacles or would decrease your interest in the program.
2. For each element, moderator will ask for (1) Overall reaction; (2) What areas did you like – what was circled; (3) What areas did you think were obstacles or that you disliked?

6. Current/Past Stewardship or Quality Improvement Activities (15 minutes)

a. Are you doing any kind of stewardship or quality improvement activities in your practice currently related to antibiotic prescribing or treatment, or any other disease area quality improvement activities?
    i. Describe those to me.
    ii. If no antibiotic related QA activities – probe for other areas of QA activities. In descriptions, include things like data collection, analysis, interpretation, personnel used, outside consulting used, design and implementation of activities, outcomes, cost and funding.
b. In your practice, is there dedicated or protected time to perform quality improvement activities? This is for any area, not just antibiotics.
c. Is there any dedicated expertise on staff for quality improvement activities? (probe if needed: like a data analyst)
d. Is there any dedicated funding for quality improvement activities?
e. What is your motivation for implementing quality improvement activities?

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7. Tools for Adoption of Antibiotic Stewardship (15 minutes)

   a. Exercise #6

Exercise #6
Moderator will hand out Sheet C Questions: 1. On this sheet I have listed a number of the issues we have discussed. I'd like you to think about your own practice and for each of the items, check whether you have access to each potential tool. If you do have access to a tool, please indicated whether you currently use this tool to support antibiotic stewardship activities and make a few notes as to why you do or don't. If you do not have access to a tool, please indicate the level of burden it would be to develop this tool for your practice. 2. Moderator will go around the room and determine the top two or three tools to discuss. 3. For each: What makes this tool such as big burden? What are some ideas you have that might help with this? Do you think it would be a serious impediment to implementing antibiotic stewardship?

8. Policies/Tools to Encourage the Adoption of Antibiotic Stewardship (15 minutes)

   a. Exercise #7

Exercise #7
Moderator will hand out Sheet D Questions: 1. There are a number of potential resources to support your efforts in the appropriate use of antibiotics. I'm going to hand out a list that I'd like you to read. Next to each item in the list is a rating scale of 1 to 5. Please check the box for each resource that describes how motivating each of these is for you. 1 means not at all useful. 5 means very useful. You can use any number in between. When you're done, we'll discuss it. 2. Moderator will collect the ratings and run a quick tally. Discussion will then start with the statement that is most motivating and work down from there. 3. Statement X has the greatest number of you giving it a high score. Those of you that gave it a high score, tell me what about X is the most useful. Are there any problem with it? (Moderator will then continue on for each of the 8 remaining statements.) 4. Is there anything that isn't on this list that you have seen utilized for other quality improvement programs that you think might be effective here?

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b. Realistically, without external aid/requirements, what is the likelihood of your adopting voluntary antibiotic stewardship activities? (defined as having the elements discussed previously: data tracking and reporting, development and implementation of improvement activities, education/training of providers and staff, etc.)
c. Do patient satisfaction scores influence your decision-making around prescribing antibiotics? What kind and how much of an impact do they have?
d. If you wanted to implement antibiotic stewardship activities in your practice, or just improve your antibiotic prescribing, what do you think would be helpful to you?
    i. Toolkits on how to implement antibiotic stewardship interventions?
    ii. Feedback on antibiotic prescribing patterns in your area/practice?
    iii. Incentives from payers?
    iv. Other?

9. Quality Measures for Appropriate Antibiotic Use (10 minutes)

a. Our last subject today is quality measures. How familiar would you say you are with the Healthcare Effectiveness Data and Information Set (HEDIS) published by the National Committee for Quality Assurance (NCQA).
    i. For antibiotics, other disease areas?
    ii. Do you report HEDIS measures related to antibiotic use as part of your quality reporting?
    iii. Do you believe that these measures appropriately capture your antibiotic prescribing practices? Is the HEDIS measure accurate for your practice? (e.g., Bronchitis (adults) and upper respiratory infections (children)) If the participants indicate they do not think these measures accurately capture their prescribing, ask what would be needed for them to trust these data?
b. At your practice, are there direct/individual financial incentives for you – i.e., bonuses – tied to your performance on quality measures (antibiotics or otherwise)? In your opinion, do they work?
c. If antibiotic use quality measures were among the measures you can choose from to report to public (CMS) or private health plans as part of quality reporting requirements, how likely is it that you will select antibiotic quality measures vs. other quality measures?

10. Thank and end group

Sheet A

	Ranking 1-6 1 = most important 6 = least important
A. Overweight and Obesity	
B. Opioid Abuse	
C. Antibiotic Resistance	
D. Misinformation About Childhood Vaccines (pediatricians only)	
E. Diabetes	

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F. Patient Non-Compliance with Drug Regimens	
G. Smoking and Tobacco Use	

Sheet B

According to the CDC, antibiotic resistance is among the greatest public health threats today.

- Leading to an estimated 12 million infections and 23,000 deaths per year in the US.

The most important modifiable risk factor for antibiotic resistance is inappropriate prescribing of antibiotics.

- Approximately half of outpatient prescribing in humans might be inappropriate including:
  - Antibiotic selection
  - Dosing or duration
  - Unnecessary antibiotic prescribing
- Estimates are that at least 30% of outpatient antibiotic prescriptions in the US are unnecessary.

Antibiotic stewardship is the effort

- To measure antibiotic prescribing
- To improve antibiotic prescribing by clinicians and use by patients so that antibiotics are only prescribed and used when needed
- To minimize misdiagnoses or delayed diagnoses leading to underuse of antibiotics
- To ensure that the right drug, dose, and duration are selected when an antibiotic is needed

Sheet C

Potential tools available to use antibiotics more effectively	Currently have access to this	If you have access, are you currently using this tool to support antibiotic stewardship efforts? Why/why not?	If you do not have access, how much of a burden would it be to develop this type of tool for your practice?
1. Timely, Accurate Feedback Reports on Antibiotic Prescribing			☐ Not a burden ☐ Some burden ☐ Large burden

2. Information on antibiotic adverse effects seen in your patients			☐ Not a burden ☐ Some burden ☐ Large burden
3. Reports from electronic health records on antibiotic prescribing practices.			☐ Not a burden ☐ Some burden ☐ Large burden
4. Clinical decision support tools for antibiotic prescribing/ diagnosis aids that leads to antibiotic prescribing			☐ Not a burden ☐ Some burden ☐ Large burden
5. Patient triage system			☐ Not a burden ☐ Some burden ☐ Large burden
6. Access to experts in infectious diseases, pharmacy, quality improvement practices			☐ Not a burden ☐ Some burden ☐ Large burden
7. Access to physician education/ training materials on antibiotic prescribing			☐ Not a burden ☐ Some burden ☐ Large burden
8. Access to materials for patient education on appropriate use of antibiotics			☐ Not a burden ☐ Some burden ☐ Large burden

Sheet D

Potential feedback loops on antibiotic use	1 Not at all useful	2	3	4	5 Very useful
1. If you received a letter from state department of health or health plan notifying your that you or your practice is a “high prescriber” of antibiotics when compared to other providers in your state/region					
2. If private health plans create a stand-alone quality incentive program for antibiotic stewardship					

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3. If private health plans include antibiotic stewardship as a “menu item” for a quality incentive program					
4. If your state publicly recognizes practices/individuals that have demonstrated most appropriate antibiotic prescribing					
5. If your state publicly publishes results of quality measures for appropriate antibiotic use for all practice locations					
6. If your state department of health publishes aggregate data on the volume of outpatient antibiotic prescribing in your state					
7. If your state publicly reports “high prescribing” practices					
8. If you received a report card from state department of health or health plans that measure the rates of antibiotic adverse events for your patients compared to other providers in your state/region					
9. If you received a report card from state department of health or health plans on quality measures for antibiotics when compared to other providers in your state/region					

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